EXPORTS: It's Time to Push

CW Report
.....P.109

NOVEMBER 26, 1960

Chemical Week

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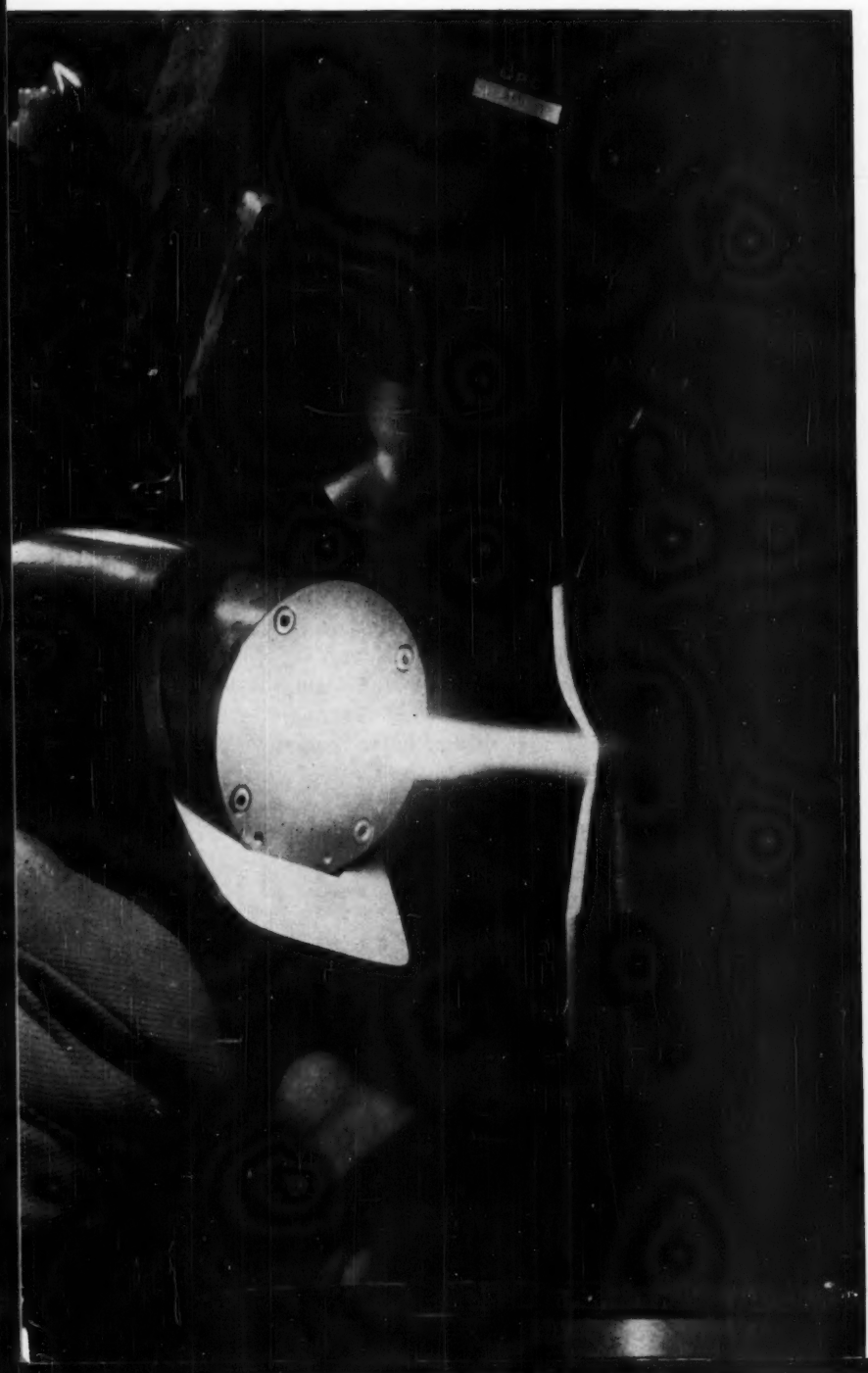

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Toluene dilemma: Supplies tighten but price hike is risky . . p. 89

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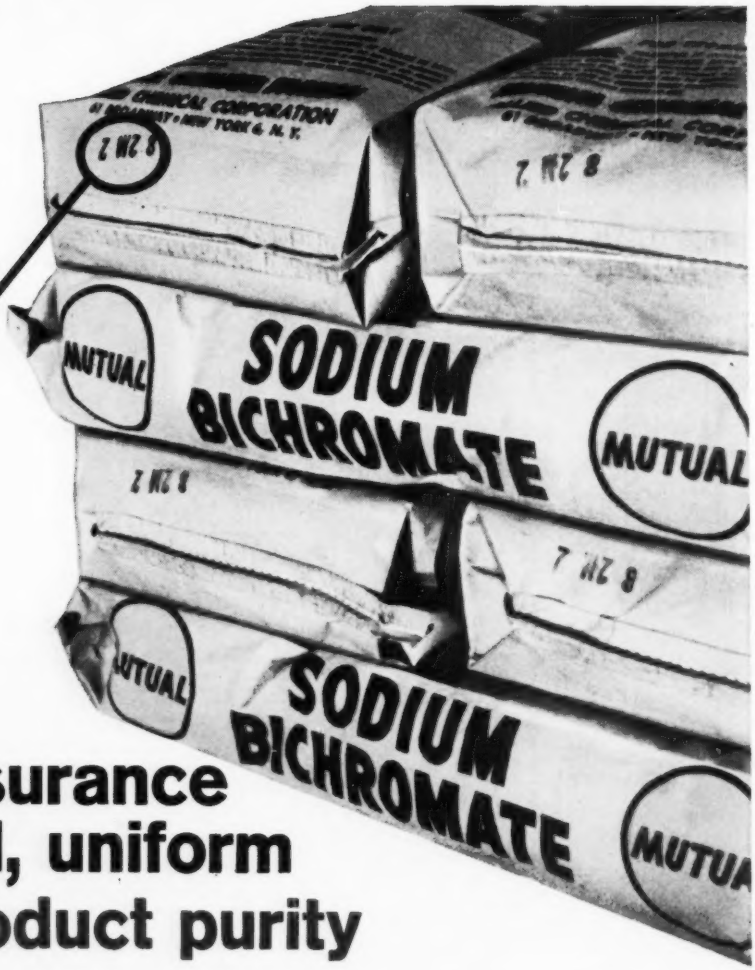

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From these three methods, D. I. S. selects the one best suited to your specific pipe-cleaning problem.

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For certain deposits in large-diameter pipelines, a pipeline pig supplements solvent cleaning.

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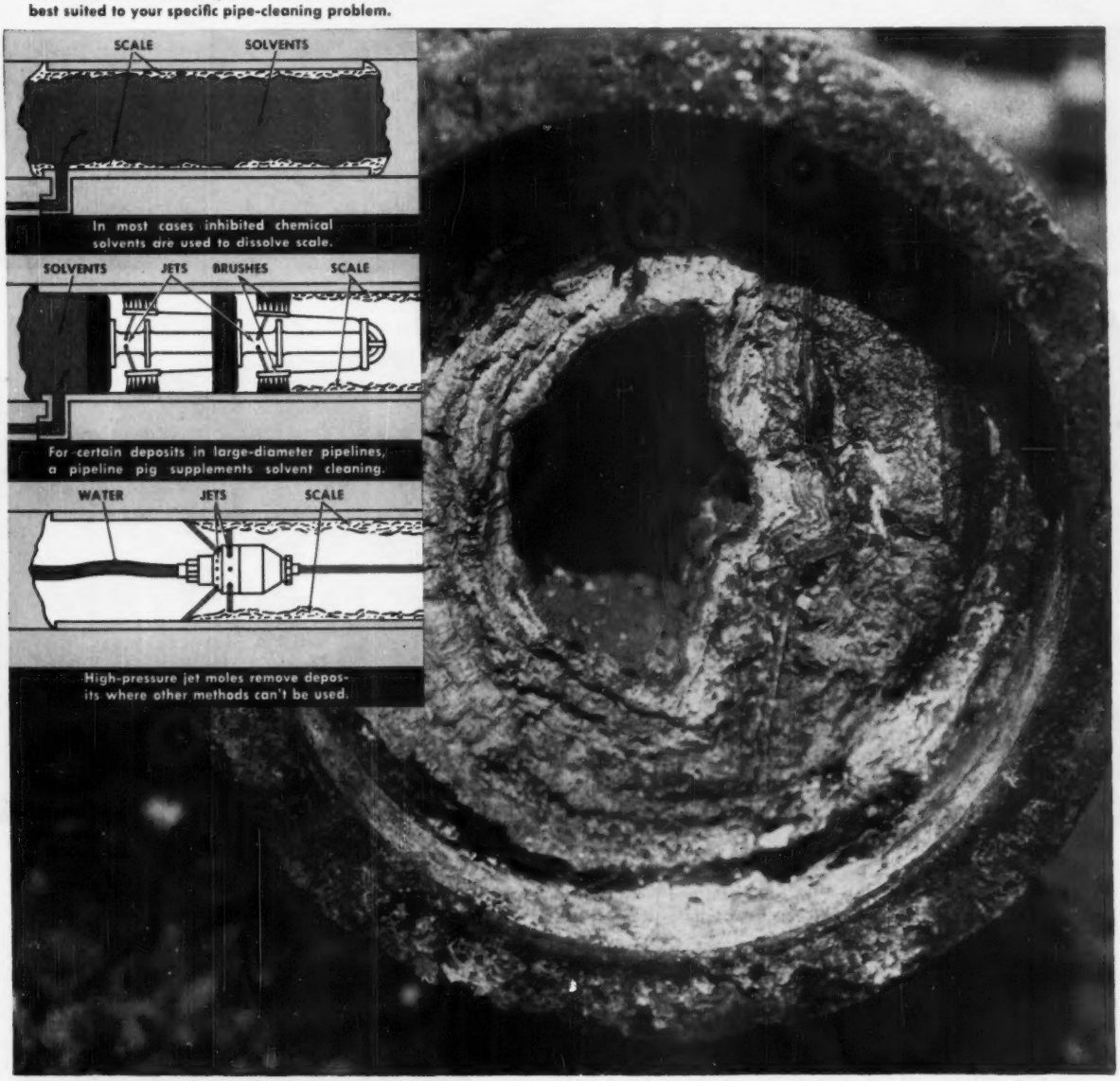

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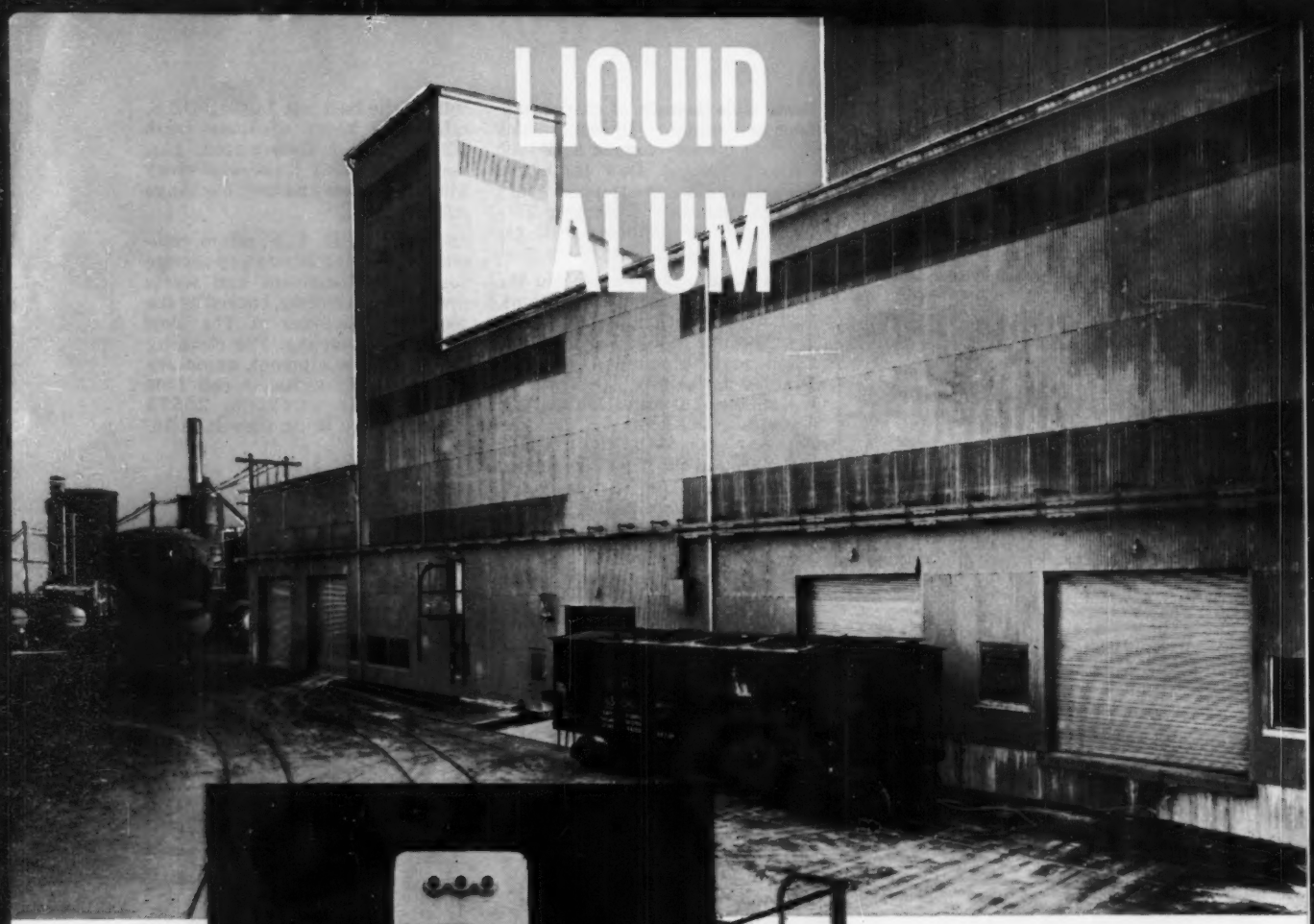

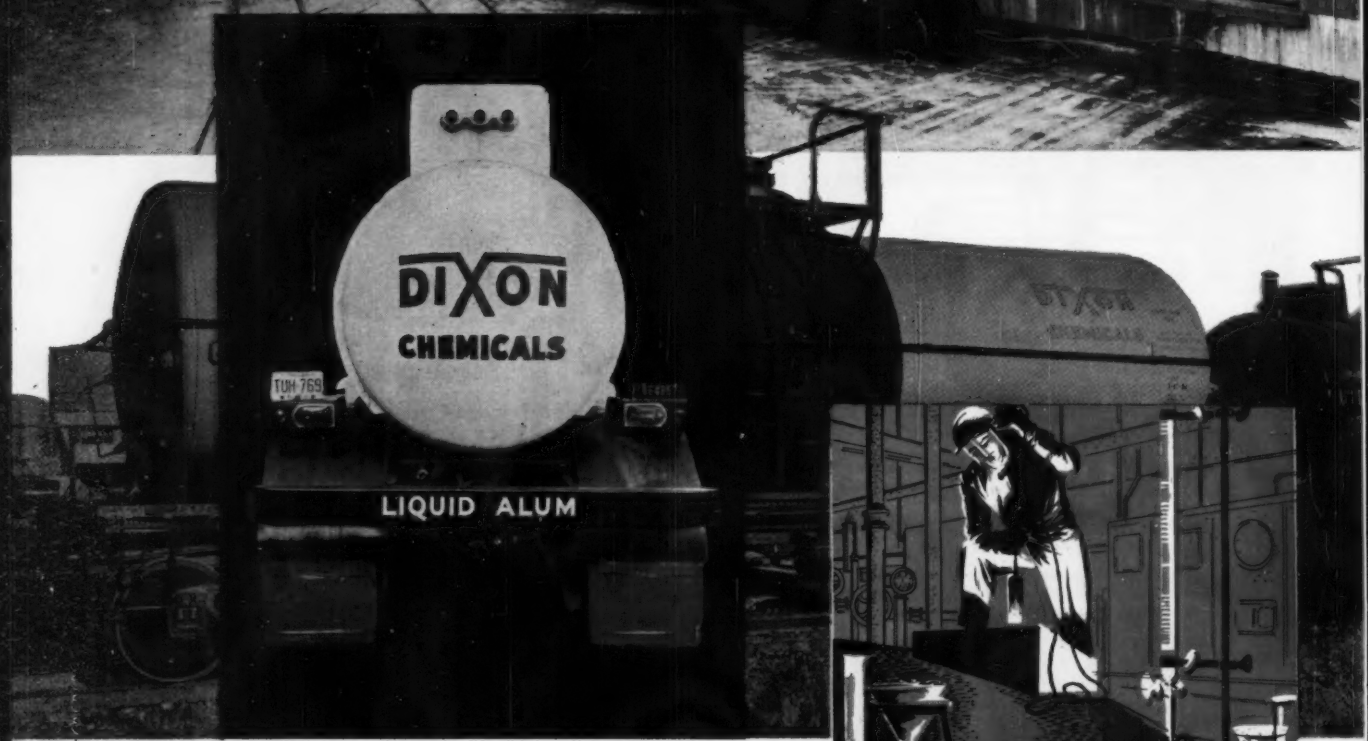

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ON THE COVER: Plasma arc guns like the one shown in this lab test may soon be doing a production-line job for spray-forming and coating high-heat-resistant equipment (p. 45).

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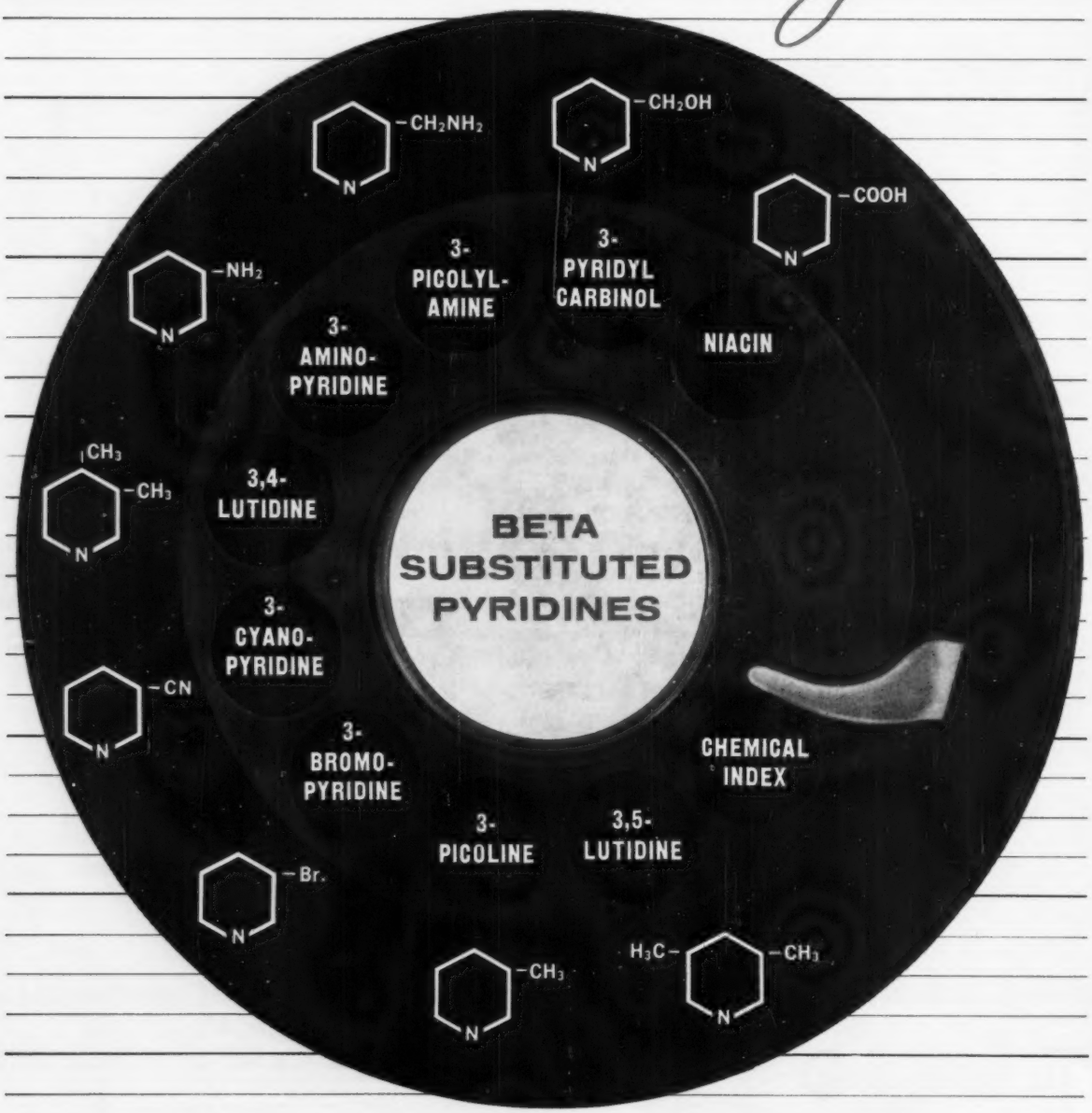

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Yardsticks for Staffing

HOW MANY EMPLOYEES ARE ENOUGH? This is always a tough question to answer, and it becomes especially nettlesome at this time of year when next year's budgets are being prepared and scrutinized.

For some job activities the answer is relatively easy to come by; in a can-filling operation, for example, a competent time and motion expert will know the inherent capabilities of the men and the machines. But the proportion of such routine jobs is dwindling. Meanwhile, more and more employees are working at jobs that defy exact measurement. How many man-hours does it take to do a market research report? How many research chemists do you need? Or—if we may intrude our own problems—how many editors does it take to turn out a weekly magazine? There is, of course, no single correct answer to any of these questions. Even if one could precisely define the objectives—both quantitatively and qualitatively—there is, in areas like these, no logically derivable relationship between manpower and output.

But if no absolute measure is possible, at least a relative measure is available through such multicompany studies as the American Management Assn.'s (*see p. 67*). Significantly, the study is of large firms (averaging about 11,550 employees each); for despite the advantages of size, a large firm has a frame big enough to carry a lot of fat without obvious obesity.

No two companies are identical, certainly. But a comparison of the number of people performing the same functions is a good starting point. Wide differences from the norms must be justified.

Is it enough, however, for American firms to compare themselves with each other? Just as we have evolved a particular way of life, so have we evolved a certain way of doing business; and while it has served us well in the relatively simple past, it may not prove viable in the complex and uncertain future.

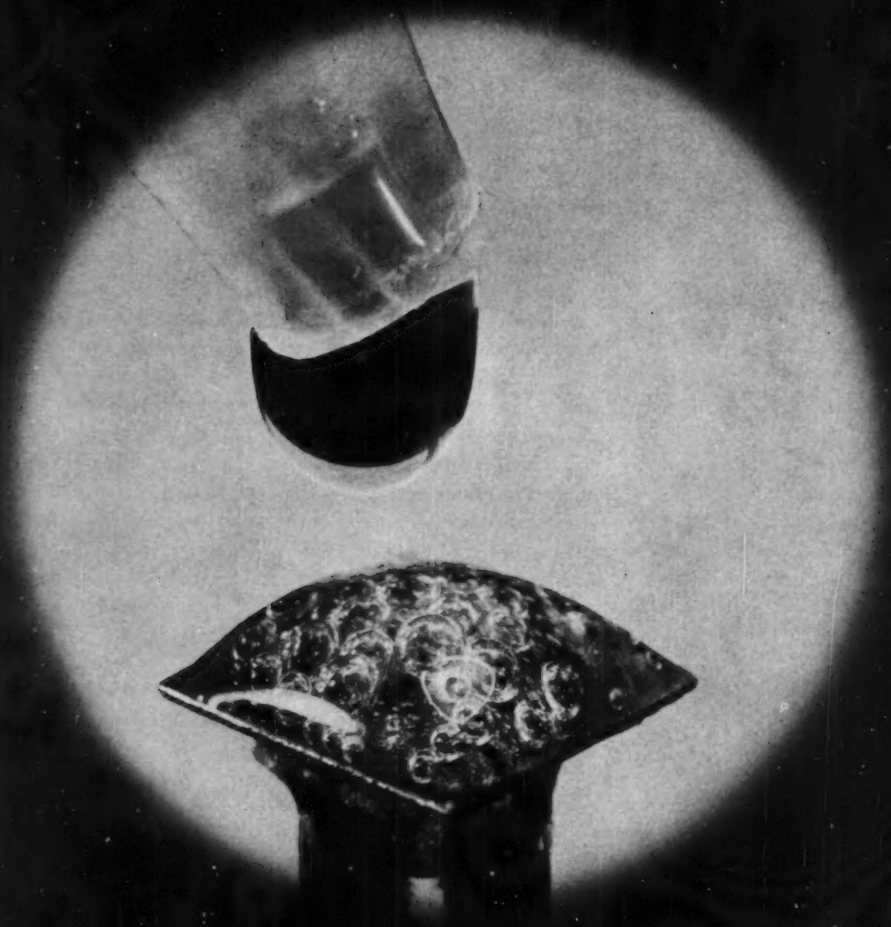
We suggest that a comparison similar to AMA's be made with European and Japanese firms—our ablest competitors in world markets. It's quite evident, both from our own observations and from those of others, that European firms of comparable size produce and sell their goods with far fewer nonproduction workers—i.e., "overhead."

Of course, just as one American firm can't look to another as an identical model, neither can American industry pattern itself after European industry. Nevertheless, we can ask whether the typical American corporate structure hasn't become oversophisticated and overcomplex; whether ancillary activities haven't burgeoned to the point of diminishing return; whether some projects aren't more useful in providing handsome four-color photographs for the annual report than in contributing to corporate profits.

We're not suggesting that Spartan rigors are either necessary or desirable. Still, a company's primary objective is to provide a reasonable return on its investment while competing in the marketplace—and today that means the world. Any company activity that doesn't contribute to that objective must be thrown over before it overthrows the company.

ETCHING A GERMANIUM WAFER WITH ELECTRONIC GRADE HF

9x magnification shows the immediate etching action of HF on a germanium wafer . . . the high resistance element in vacuum tubes, transistors and diode rectifiers



ELECTRONIC and REAGENT GRADE ACIDS

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Swedish Drugs

TO THE EDITOR: We have read with great interest your article (*June 18, p. 133*) giving a summary of the chemical industry of Europe.

When describing the chemical industry of Sweden you have unfortunately not mentioned anything about the rapidly expanding pharmaceutical industry, and in the list of the big chemical factories our enterprise is not included in spite of the fact that AB Astra is regarded as one of the three biggest chemical industries in Sweden. . . .

We enclose a copy of a part of the article for your kind attention.

SVEN SUNDLING
AB Astra
Sodertalje, Sweden

Rubber Above 150 F

TO THE EDITOR: In your article "Wet Processing Boosts Florida Fertilizers" (*Aug. 27*) this statement is made (*p. 70*): "Rubber-lined steel pipe and rubber-lined steel storage tanks are required. As rubber has an upper temperature limit of 150 F, acidproof brick is used to line the rubber, permit higher temperatures."

The author can probably be excused for this completely erroneous temperature limit for rubber linings, since it is frequently still seen in the literature. On the other hand, in the same Florida phosphate plants mentioned in the article, rubber linings without brick sheathing may be found operating satisfactorily in temperatures up to 200 F.

Ironically enough, we at The B. F. Goodrich Co. may be largely responsible for this misinformation.

Over 30 years ago the discovery of a thermoplastic adhesive, which was given the name of Vulcalock, made rubber lining of metal practical for the first time. This material did have an upper limit of about 150 F. Because this was the only practical rubber-to-metal adhesive then known, chemical resistance tables were widely distributed to the trade showing the resistance of rubber to a wide list of chemicals, all at a maximum of 150 F. Of course, that was the limit of that adhesive and not of rubber itself.

Unfortunately, that original list, or modifications of it, are still being distributed and accepted as the maximum for rubber. With the discovery of different adhesives that have a much higher temperature range, we can now think in terms of the actual limit of the rubber rather than the adhesive.

Today we recognize no specific maximum temperature limit for rubber linings, if the proper grade of rubber is used. Of course, the service life is shortened as the temperature increases. At some temperatures—and this varies with each installation—brick sheathing will extend the service life of rubber enough to make its cost justified.

T. E. SAXMAN
Technical Service
B. F. Goodrich Industrial Products Co.
Akron, O.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

Project Principia

TO THE EDITOR: In reference to the Oct. 1 "Viewpoint" (*p. 5*) you attempt to make the point that "in the field of propellants for rockets and missiles, the chemical industry has been caught in an unenviable position."

For your information . . . I have attached a copy of a speech presented at the 15th annual meeting of the Armed Forces Chemical Assn. Purpose of the speech was to inform the chemical industry of various programs within the Advanced Research Projects Agency. Of particular pertinence to your Viewpoint criticism is the fact that Project Principia was suggested by Dr. George Kistiakowsky in the middle of '57. His recommendations (to enlist the aid of the chemical industry to perform advanced propellant chemistry) were accepted by the Secretary of Defense, and the task of planning and funding this extensive program was assigned to the Advanced Research Projects Agency in the spring of '58.

Project Principia is now entering its third fiscal year of funding, and we are pleased to say that a variety of new chemicals are now available for use by the rocket-engine developers. Additional new chemicals will be available as our research programs bear fruit.

We have found that the chemical industry has been most helpful to supply top scientific talent, facilities and, of utmost importance, new ideas to help us reach our goal.

Our extensive list of research contracts indicates that the following chemical companies are aiding us in our search for high-energy propellants:

American Cyanamid
Allied Chemical
Dow Chemical
Esso Research and Engineering
Minnesota Mining
Olin Mathieson Chemical
Thiokol Chemical
Pennsalt Chemicals
Monsanto Chemical
Food Machinery and Chemical
Ethyl Corp.
Callery Chemical
Peninsular Chemresearch
Rohm & Haas

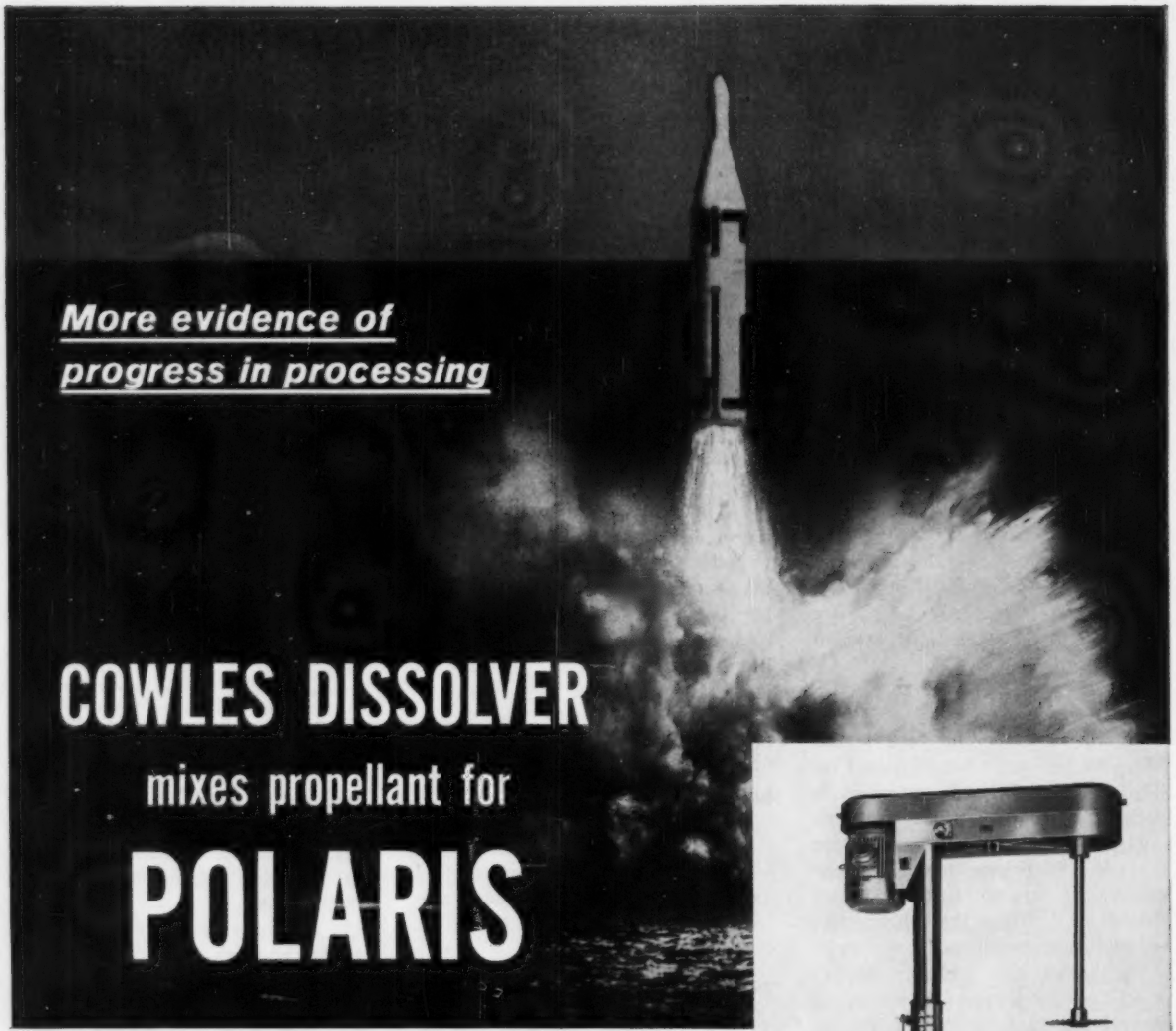
These chemical companies were supported in fiscal '60 to the extent of $10 million for Project Principia only. Additional chemical companies are receiving support from these three services.

In all of the government solid-propellant research and development work there is excellent cooperation and exchange of results. To perform this monumental task the Solid Propellant Information Agency, Applied Physics Laboratory, Johns Hopkins University, was set up to promote direct information exchange.

We feel that the Army, Navy, Air Force, NASA and ARPA programs on solid-propellant research are well coordinated with a minimum of duplication but with a maximum of cooperation. We are also indebted to the chemical industry for invaluable assistance during the past two years and look forward to their continued expressions of interest.

G. V. MOCK
Assistant Director
Solid Propellant Chemistry
Advanced Research Projects Agency
Washington, D.C.

Our point: a noted rocket scientist is complaining that no new chemicals are available now. This is implied on p. 5 of the speech received from Mr. Mock, where it says "Progress to date has been limited. . . ." The scientist's



More evidence of progress in processing

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mixes propellant for

POLARIS

To meet the challenge of producing space-age fuels in big volume for missiles and rockets, Aerojet General Corp. engineers have designed the first continuous process for propellants.

A monster Cowles Dissolver was chosen as the key unit in the system for maximum efficiency in changing from batch-type paste mixing to the continuous method. Advantages are noteworthy –

1. Big volume fuel production for large missiles and rockets now practical for first time.
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3. Fire and explosion hazards greatly reduced.
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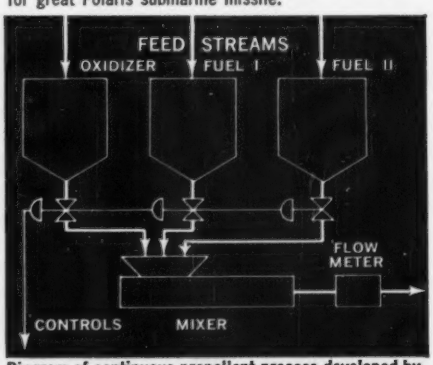


Diagram of continuous propellant process developed by Aerojet engineers. 621

contention was that they should have been ready now.

While it is impossible to predict the rate at which technological progress should take place, it is incontrovertible that it will not go forward at the ideal rate if there is bickering among the participants. And it is naive to think that such bickering has been absent in our rocket program. We said that the creation of a new board (to coordinate the space program between NASA and the Defense Dept.) "fills a long-felt need."—ED.

Inhibitors Report?

TO THE EDITOR: I wish to compliment CHEMICAL WEEK on the very worthwhile contribution of CW Reports such as "Metal Organics" (*Sept. 17*).

I hope that it will be practical for you to increase the frequency of such coverage of newer and expanding fields of industrial chemicals . . . as well as to issue supplements every three or five years to earlier CW Reports such as your excellent three-part report covering organic agricultural chemicals in 1956.

Regarding future CW Reports, I am sure that many readers share my interest in a CW Report covering organic corrosion inhibitors.

R. E. BENSON
Benson Process Engineering Co.
Eden, N.Y.

Triad's Multiclient Studies

TO THE EDITOR: We saw with great interest your article on "Multiclient Market Research" (*CW, Nov. 5, p. 73*). We are somewhat dismayed, however, that although you mentioned our endeavors in this field, you omitted us in the listing of such companies.

Triad Consultants is now finishing a multiclient report on "The Chemical Requirements of the Pulp and Paper Industry," which covers the field from the forest to the consumer product. We feel that this study is unique, in that it covers the chemical demand of the entire pulp and paper industry, rather than just specific segments.

May we also mention that subscriptions for the study are still open.

ROBERT FRANK
Triad Consultants
Old Greenwich, Conn.

Similar Company Names

TO THE EDITOR: We have read with interest (*November 5, p. 27*) the article titled "Urethane Coatings Aim High for New Jobs."

This article mentions that urethane coatings are being used extensively to coat golf balls and mentions Chemical Coatings & Engineering (Media, Pa.) and other concerns.

Our company originated, developed, manufactures and is selling . . . high-quality polyurethane golf ball finishes to all large manufacturers of golf balls (with one exception) and many smaller manufacturers. . . .

EDWARD H. CHRIST
The Chemical Coatings Corp.
Rocky Hill, Conn.

Confusion is inherent in the fact that the Pennsylvania firm, with a very similar name, has also supplied a similar urethane coating for over a year and is selling it to a large golf ball manufacturer. ED.

MEETINGS

Glass Container Manufacturers' Institute, semiannual meeting, Boca Raton, Fla., Nov. 28-Dec. 1.

Fourth annual conference of Food & Drug Administration and the Food Law Institute, Auditorium of the Dept. of Health, Education & Welfare, Washington, D.C., Nov. 28-29.

American Institute of Consulting Engineers, annual dinner, Waldorf Astoria Hotel, New York, Nov. 29.

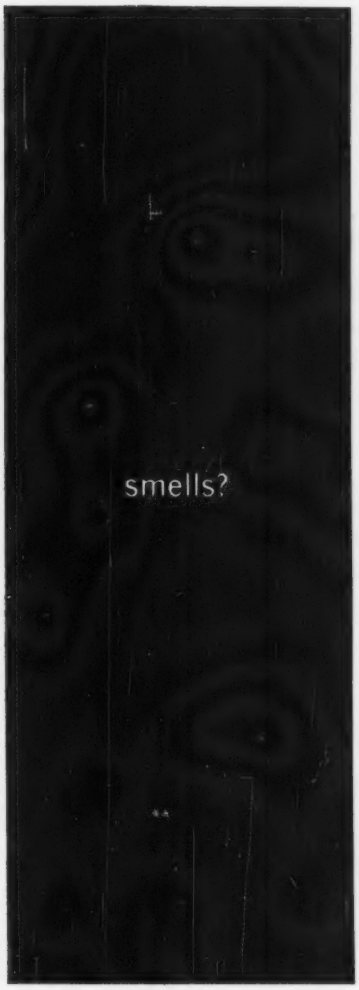
Midwest Research Institute and *Chemical Engineering* magazine, cosponsored conference on new chemical engineering; Hotel Muehlebach, Kansas City, Mo., Nov. 29-30.

Second International Reinforced Plastics Conference, sponsored by the British Plastics Federation, Cafe Royal, London, Nov. 30-Dec. 2.

American Institute of Chemical Engineers, annual meeting; theme: chemical engineering in government programs; Statler Hilton Hotel, Washington, D.C., Dec. 4-7.

American Nuclear Society, annual winter meeting, Mark Hopkins and Fairmont hotels, San Francisco, Dec. 12-14. Two highlights: talk on transuranium elements by Glenn T. Seaborg; and the Atom Fair, jointly sponsored by ANS and the Atomic Industrial Forum at the Masonic Temple, San Francisco, Dec. 12-16.

American Society of Agricultural Engineers, winter meeting, Palmer House, Chicago, Dec. 14-16.



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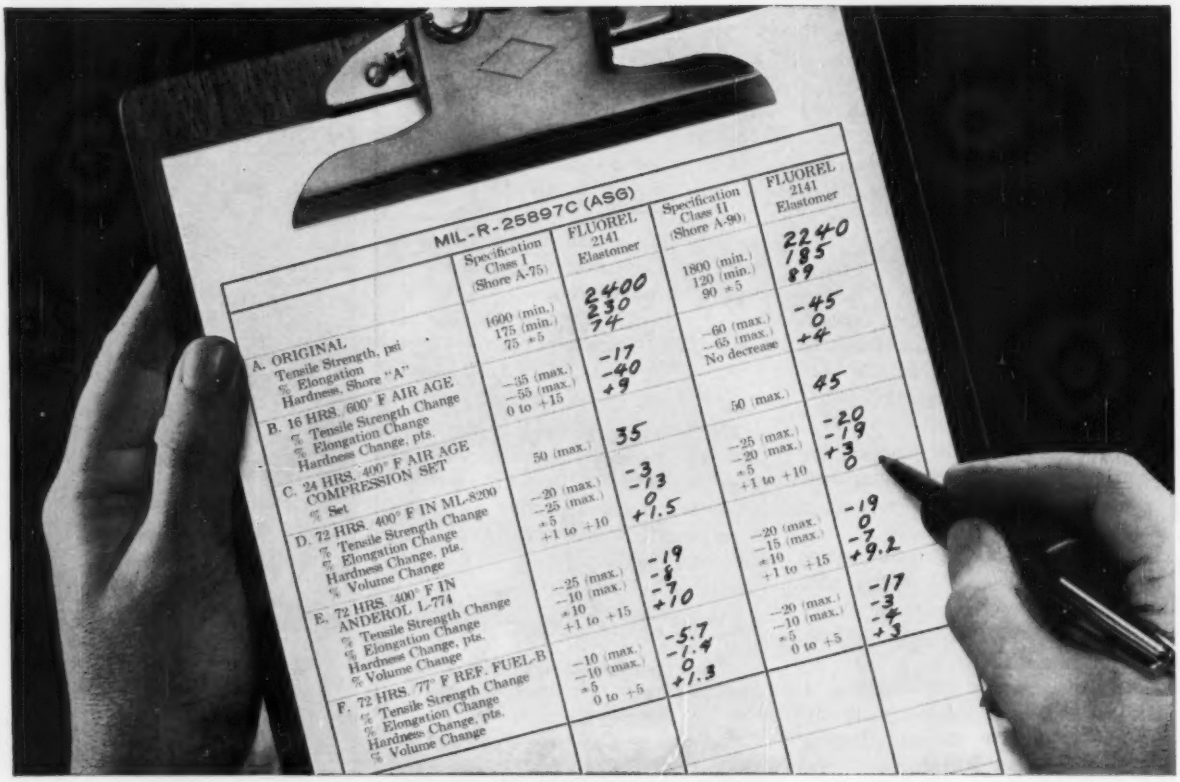
3M COMPANY CHEMICALS

THE RAW MATERIALS OF PROGRESS

How many of these new elastomer properties have you been waiting for?



New FLUOREL® 2141 meets MIL-R-25897C specs,

BRAND ELASTOMER

scores new processing and performance highs!

Outstanding Mooney Scorch Rating makes Fluorel 2141 ideal material for the processor of fluorinated rubber. Exceptional Mooney viscosity/time ratio.

Non-combustibility. Thermal stability of Fluorel 2141 rated at 400° F. for continuous, long-term service . . . above 600° F. for shorter periods.

Corrosion resistance of Fluorel 2141 is excellent . . . to corrosive chemicals, fuels, solvents and ozone.

Minimal compression set is one of the important properties of Fluorel 2141 . . . only 30% of original deflection (25%) in 70-hour, 300° F. tests.

Better and faster cures aid processing cost reductions with Fluorel 2141. You get fewer rejects, less scrap . . . heat build-up is minimized, scorch eliminated.

Low-temperature tolerance. Thin sections may be bent without cracking at temperatures low as —50° F. Gehman stiffness T_{10} is 3° F.

Safe reprocessing. The inherent safety of Fluorel 2141 permits repeated reprocessing to produce highest quality parts for critical uses.

Wide range of applications. Fluorel 2141 is specified wherever there is need for high temperature resistance, chemical resistance, and low compression set. Many applications in aircraft, missile, automotive, and chemical fields. Specify to your compounder, or write: 3M Chemical Division, Dept. KAK-110, St. Paul 6, Minnesota.

"FLUOREL" is a reg. TM of 3M Co.

CHEMICAL DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

why chemical companies are taking a closer look at DELHI-TAYLOR

Chemical companies are taking a closer look at Delhi-Taylor as a source for their raw materials. The reason? Flexibility and dependability of Delhi service. Here are just a few examples:

- Delhi can move quickly into production on new petrochemicals. Our recent Orthoxylene plant, engineered by our own staff, was in production in 6 short months.
- Our selected feed stocks and diversified petroleum streams offer an unlimited source of chemicals.
- The location of our plants on the Inland and Coastal Waterways with multiple docking facilities means low cost, fast deliveries.
- Strategically located petrochemical terminals add to our delivery advantages.
- Rigid quality control and testing procedures assure highest purity products.
- Our experienced technical service department can assist you in planning your products.

Delhi is at your service. Now in production on a wide range of aromatic chemicals and aliphatic solvents, our plant facilities are geared to move quickly in new chemical directions.

CHEMICAL DIVISION

DELHI-TAYLOR OIL CORPORATION

FIDELITY UNION TOWER, DALLAS 1, TEXAS • 415 MADISON AVE., NEW YORK 17, N. Y.
CORPUS CHRISTI • CHICAGO • CHARLESTON, S. C. • BATON ROUGE • HOUSTON

THE CASE FOR LITHIUM: IONIC SIZE

Pauling's formulation of univalent crystal radii indicates that the lithium ion is indeed the smallest alkali metal ion.

ATOMIC AND IONIC RADII OF ALKALI METALS (PAULING)

	Li	Na	K	Rb	Cs
M (Angstroms)	1.225	1.572	2.025	2.16	2.35
M+(Angstroms)	0.60	0.95	1.330	1.48	1.69

Lithium's small ionic radius permits shorter internuclear distances between cation and anion. Thus, the lattice or crystal energies of lithium salts should be higher than those of other alkali metal salts. An analysis based on the Born-Haber cycle readily shows this to be true.

The heats of formation of large anion lithium compounds are usually lower than other alkali metal compounds due to lithium metal's high ionization potential and heat of sublimation. But this is not true for small anion lithium compounds. LiF, Li_2O, LiH, Li_2C_2, Li_2S, and Li_3N are all more stable than their other alkali metal congeners. And the freedom with which lithium combines with small anions may well be responsible for its excellent performance in metal scavenging and degassing.

IONIC POTENTIAL The concept of ionic potential (ionic charge/ionic radius) successfully relates the charge densities and deforming powers of the alkali metal ions. Lithium, of course, has the highest ionic potential of the alkali metals, and therefore, the highest free energy of hydration. And a modified Born-Haber cycle shows that lithium in aqueous systems matches cesium as the strongest reducing agent of the alkali metals.

SOLVATION ENERGY High ionic potential is also responsible for the unusual solubility behaviors of ionic lithium compounds. Lithium's high solvation energy favors breakdown of the ionic crystal lattice by solvent-ion interaction. Thus, the utility of LiH and $LiAlH_4$ as reducing agents. Unlike NaH and $NaAlH_4$, they are relatively soluble in diethyl ether, a desirable medium.

One indication of the extensive solvent-ion interaction suggested is the high hydration energy of the lithium ion . . . leading to an increase in lithium ion size in solution. The size increase is due to an adhering sheath of solvent molecules or dipoles. Thus, the lithium ion, smallest of the alkali metal ions in the solid state, is the largest in solution in water.

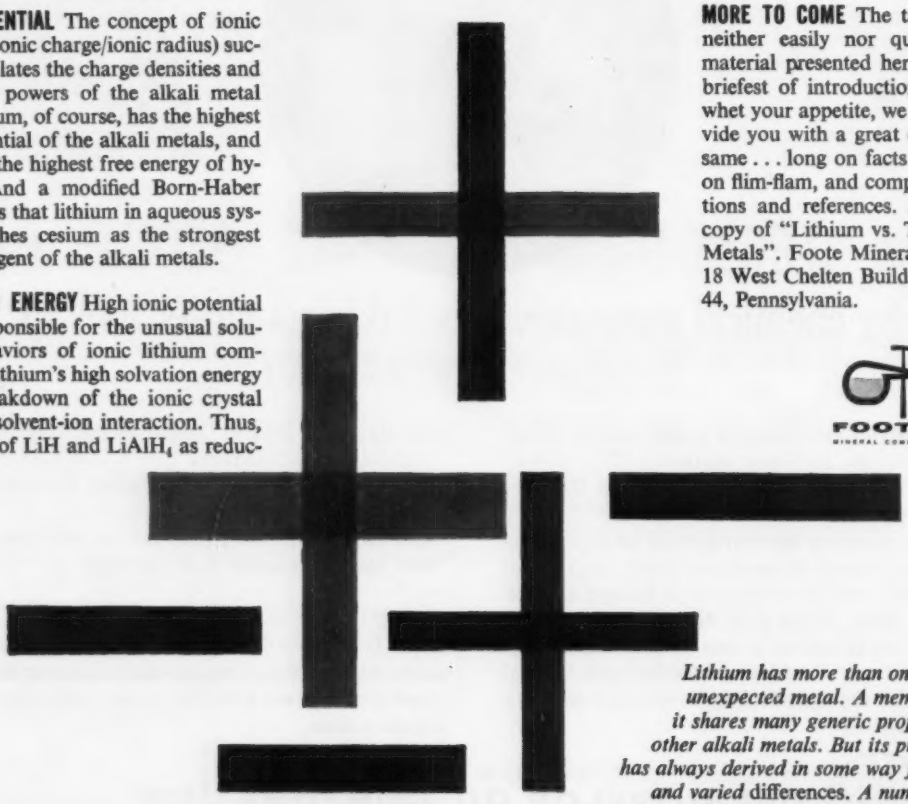
IONIZATION POTENTIAL AND RELATED PROPERTIES OF THE ALKALI METALS

	Li	Na	K	Rb	Cs
Ionization Potential (electron volts)	5.390	5.138	4.339	4.176	3.893
Oxidation Potential (E_o at 25°C, volts)	3.02	2.71	2.92	2.99	3.02
Heat of sublimation (kcal, 25°C)	36.44	25.95	21.52	20.50	18.83
Heat of Hydration of Gaseous Ion (kcal/mole)	123	97	77	70	63

The lithium ion—water dipole aggregates are probably responsible for the severely negative deviations from ideal solution behavior exhibited by lithium salts in solution. Lithium salts yield solutions with abnormally low colligative properties . . . very low aqueous vapor pressures, very low freezing points, etc. . . . as well as the highest stoichiometric activity coefficients of all the alkali metals. For equivalent molar concentrations of alkali metal salts, lithium salts have the highest effective thermodynamic concentrations, the basis for the superior performance of lithium bromide solutions in absorption refrigeration, and of lithium chloride solutions in humidity control equipment.

BOND CHEMISTRY With the highest electronegativity of the alkali metals, lithium has the greatest tendency to form covalent or mixed covalent bond types. Thus, lithium alkyls tend to be much more covalent than corresponding sodium alkyls, and as a result are far more soluble in non-polar solvents. But there is still sufficient polar or ionic character to the lithium-carbanion bond to exert an orienting force on such reactions as the stereospecific polymerization of isoprene.

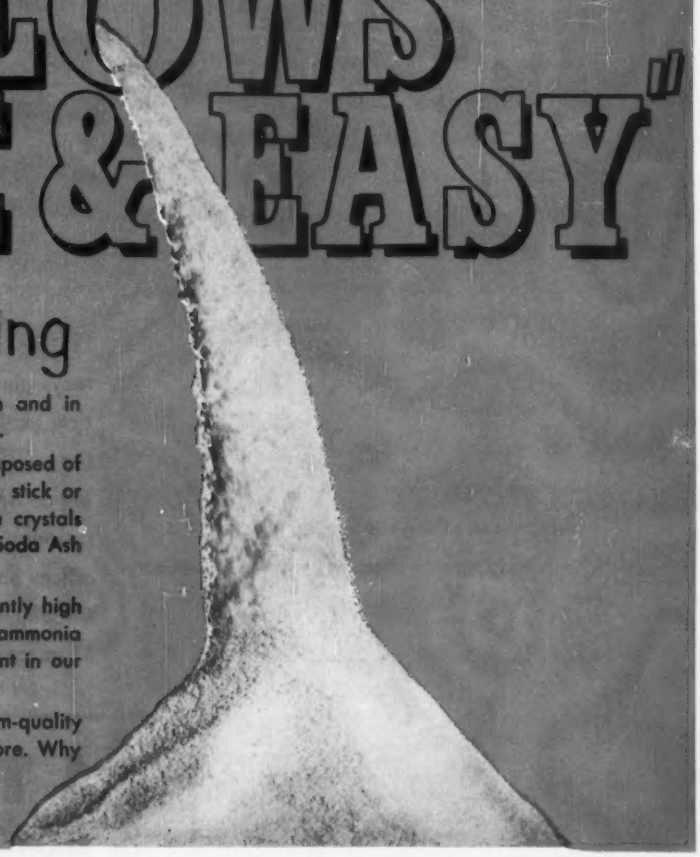
MORE TO COME The tale of lithium is neither easily nor quickly told. The material presented here constitutes the briefest of introductions. But if it has whet your appetite, we can happily provide you with a great deal more of the same . . . long on facts and ideas, short on flim-flam, and complete with derivations and references. Just write for a copy of "Lithium vs. The Other Alkali Metals". Foote Mineral Company, 420 18 West Chelten Building, Philadelphia 44, Pennsylvania.



FOOTE
MINERAL COMPANY

Lithium has more than once been called the unexpected metal. A member of Group IA, it shares many generic properties with the other alkali metals. But its primary usefulness has always derived in some way from its many and varied differences. *A number of the more interesting of these differences are discussed here, all of them related to the fact that, under varying circumstances, lithium has at once both the smallest and the largest of the alkali metal ions*

fmc® SODA ASH FLOWS "FREE & EASY"



for faster handling

You save time unloading FMC Soda Ash and in getting it from bins or silos into operations.

The reason is simple. FMC Soda Ash is composed of roller-shaped crystals that don't lump up, stick or bridge over. Besides flowing freely, these crystals don't degrade into fines. They make FMC Soda Ash virtually dust-free.

Other features of FMC Soda Ash: Consistently high purity, fast dissolution, low iron and no ammonia content. And you get fast, reliable shipment in our own covered hopper cars.

You can enjoy the advantages of premium-quality FMC Soda Ash and it will cost you no more. Why not ask for our quote?

fmc FOOD MACHINERY AND CHEMICAL CORPORATION ®

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FOOD MACHINERY AND CHEMICAL CORPORATION

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161 E. 42nd STREET, NEW YORK 17

FOR A TRULY MULTI-PURPOSE WHITE PIGMENT SPECIFY

TITANOX*-RA-50

TITANOX-RA-50—the rutile titanium dioxide pigment—is *doubly* versatile. Not only is it a favorite for many different types of coatings, but also for finishes that must perform multiple services. For example, many industrial product finishes must retain their good appearance and durability both indoors and outdoors. TITANOX-RA-50 helps them do just that.

This truly multi-purpose white pigment is a favorite because of these outstanding characteristics:

- **fast wetting**
- **extreme fineness of grind**
- **high whiteness**
- **reduction of after-yellowing of vehicles**
- **high resistance to chalking, without significant loss of tint clarity.**

These qualities make TITANOX-RA-50 ideal for whitening, brightening and opacifying:

- **Paints . . . water emulsion paints and coatings, interior-exterior enamels, industrial finishes of all types, white and tinted exterior house paints, porch and deck enamels and maintenance paints.**
- **Paper . . . particularly latex and other types of coatings to be used for containers, wrappers and packages.**
- **Plastics . . . especially vinyl sheeting and floor coverings.**

Our Technical Service Department is always glad to help you with your pigmentation problems. There's a TITANOX pigment for anything that needs whitening, brightening or opacifying. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments, Ltd., Montreal.

7830

*TITANOX is a registered trade mark of National Lead Company for titanium pigments offered by Titanium Pigment Corporation.

TITANOX
the brightest name in pigments

TITANIUM PIGMENT CORPORATION
Subsidiary of NATIONAL LEAD COMPANY

the HS 40 W

B-P PRESSURE CENTRIFUGAL

BAKER PERKINS research now brings you the HS 40 W Universal Pressure Centrifugal, engineered for normal operation at 1000 times gravity and internal pressures to 150 psi. Several important features are entirely new: A MECHANICAL SELF-BALANCING SHAFT SEAL is positioned where the main shaft enters the housing and is the only major moving seal. A CLAMPING AND SELF-ALIGNING DOOR SEAL consisting of a floating ring plus two O-rings assures a completely safe lock without the necessity of tightening bolts. A SIMPLIFIED DESIGN OF THE DISCHARGE KNIFE AND CHUTE. Complete discharge of all solids is effected, eliminating swirling or dusting of solids within the housing. PROGRESSIVE PEELING. For the first time, provision is made for the peeler knife to enter the cake at successively increasing depths. Glazing of the heel is eliminated. Air displacement is controlled during both the charging and peeling operations.

As in all Baker Perkins Universal Centrifugals, the interior of the new model is completely and readily accessible. For complete specifications of the high capacity HS 40 W Universal Pressure Centrifugal, see your B-P sales representative or write to:

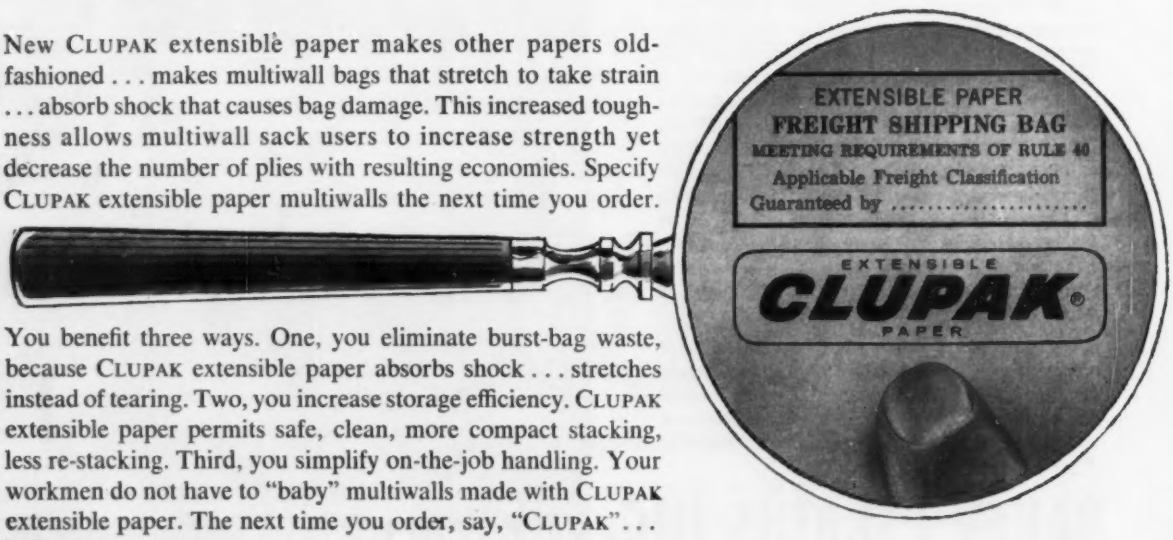
BAKER PERKINS INC.

CHEMICAL MACHINERY DIVISION
SAGINAW, MICHIGAN

394

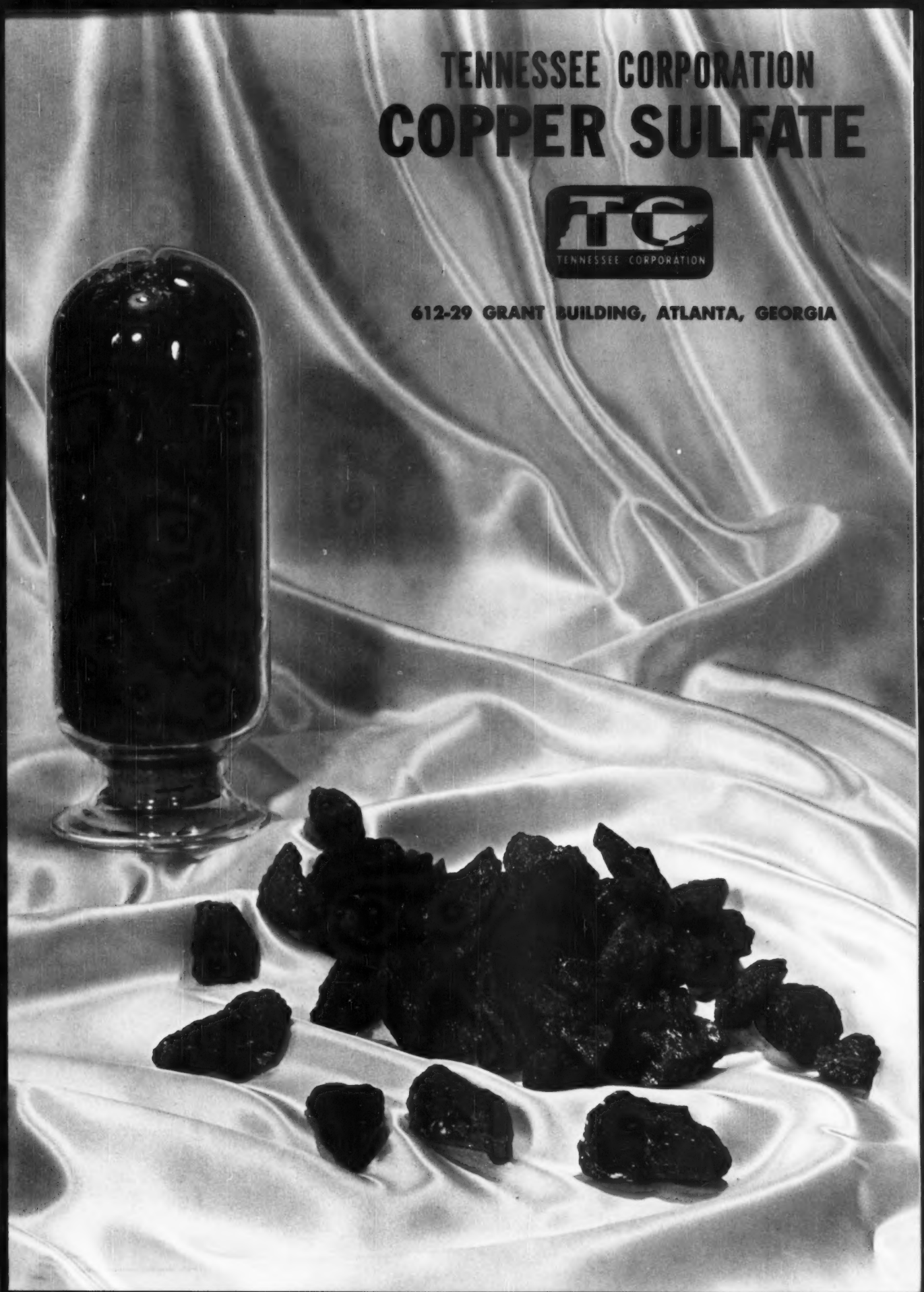
ELEMENTARY...IT'S A EXTENSIBLE CLUPAK® PAPER* MULTIWALL BAG ...THAT'S WHY IT WON'T BREAK!

New CLUPAK extensible paper makes other papers old-fashioned . . . makes multiwall bags that stretch to take strain . . . absorb shock that causes bag damage. This increased toughness allows multiwall sack users to increase strength yet decrease the number of plies with resulting economies. Specify CLUPAK extensible paper multiwalls the next time you order.



You benefit three ways. One, you eliminate burst-bag waste, because CLUPAK extensible paper absorbs shock . . . stretches instead of tearing. Two, you increase storage efficiency. CLUPAK extensible paper permits safe, clean, more compact stacking, less re-stacking. Third, you simplify on-the-job handling. Your workmen do not have to "baby" multiwalls made with CLUPAK extensible paper. The next time you order, say, "CLUPAK"... before you say paper.

*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications. Clupak, Inc., 530 5th Ave., N. Y. 36,


TENNESSEE CORPORATION
COPPER SULFATE
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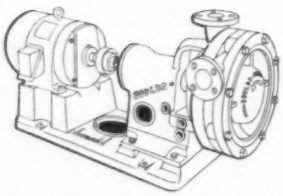
TENNESSEE CORPORATION
612-29 GRANT BUILDING, ATLANTA, GEORGIA

IS THIS HAPPENING INSIDE YOUR PUMPS?



The Goulds-Pfaudler glassed pump is available in conventional hydraulic design, simplifying installation and maintenance. Four sizes with capacities up to 700 GPM, heads up to 140 ft.

When you pump corrosives, the inside of your pump *can* look like this. Or . . .

You can pump corrosives *without* corrosion with the Goulds-Pfaudler Fig. 3708 glassed pump. *Every surface that comes in contact with the pumpage* is protected by tough borosilicate glass fused permanently to the metal!

This glass-to-metal bond resists most acids at temperatures up to 350°F and alkalies at moderate temperatures.

You also prevent loss of product due to contamination, since glass is *inert*. Glass is *smooth*—discourages product adhesion and scale build-up.

For all the details, write for Bulletin 725.2 . . . plus a second booklet, "It's What's Inside That Counts," that gives you the inside story behind the new Goulds-Pfaudler glassed pump. Write Goulds Pumps Inc., Dept. CW-110, Seneca Falls, New York.

GOULDS GP PUMPS

for waterproofing...nothing equals

Piccopale

the versatile petroleum resin

Easy to use Piccopale is a neutral, low cost petroleum hydrocarbon resin. Completely polymerized, Piccopale is non-reactive and uniform, has wide compatibility, and is soluble in aromatics and low solvency naphthas.

Piccopale offers new approaches and economic advantages to compounders in many fields that demand alkali, acid, and water resistance.

Piccopale is readily available from strategically placed warehouses and in large quantity from its production points in melting points 70°C through 110°C (B & R) in molten, solid, flaked, solution and emulsion form.

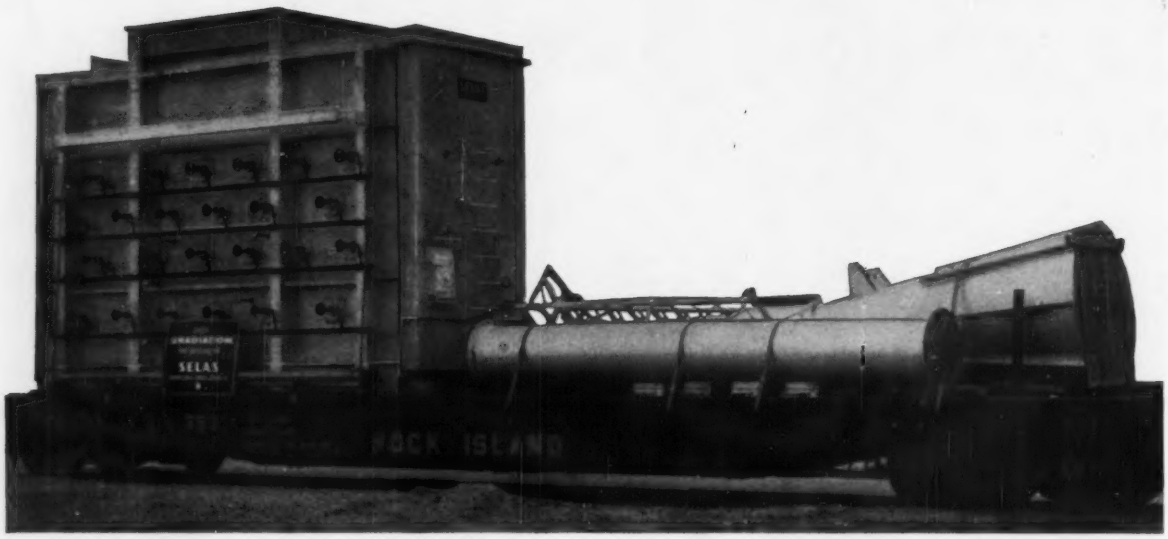
Don't forget specific gravity:
Rosin @ 20°C—1.087
Piccopale @ 20°C—0.975

The trademark of quality

PENNSYLVANIA INDUSTRIAL CHEMICAL CORPORATION
CLAIRTON, PENNSYLVANIA

NEW SLANTS ON HEAT PROCESSING FROM SELAS

save time and money at the job site with SELAS PREFABRICATION



Selas prefabrication means much more than the generally-accepted definition: it means shop-assembly! Shop-assembled Selas Gradiation® tubular heaters . . . both vertical and horizontal . . . are *complete* when they are shipped out. Burners, brickwork, arch tiles are in place; manifold piping is attached and intact—including flanged connections; stacks and ducts are fully insulated. Heating coils may be shipped installed or delivered to job site, pre-assembled on tube supports, as desired.

Shop-assembled or field-erected . . . Selas Gradiation heaters will give you extended "on-stream" periods, high conversions and selectivity, Zone Control of heat input, and increased tube life.

May we arrange for a Selas field engineer to discuss your heat processing requirements with you? For this service—without cost or obligation to you—or for a copy of Bulletin 1043 "Gradiation Heating for Petroleum and Chemical Processing," write to Fluid Processing Division.

SELAS CORPORATION OF AMERICA
911 Dreshertown Road, Dresher, Pa.

EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S.A., Pregny, Geneva, Switzerland. INTERNATIONAL AFFILIATES—Benelux, Canada, England, France, Germany, Italy, Japan, Portugal, Spain.

SELAS

HEAT AND FLUID PROCESSING ENGINEERS
DEVELOPMENT / DESIGN / CONSTRUCTION

GRADIATION is a registered trademark of Selas Corporation of America.

COMPARE AMSCO WITH ANY OTHER SOLVENT SUPPLIER

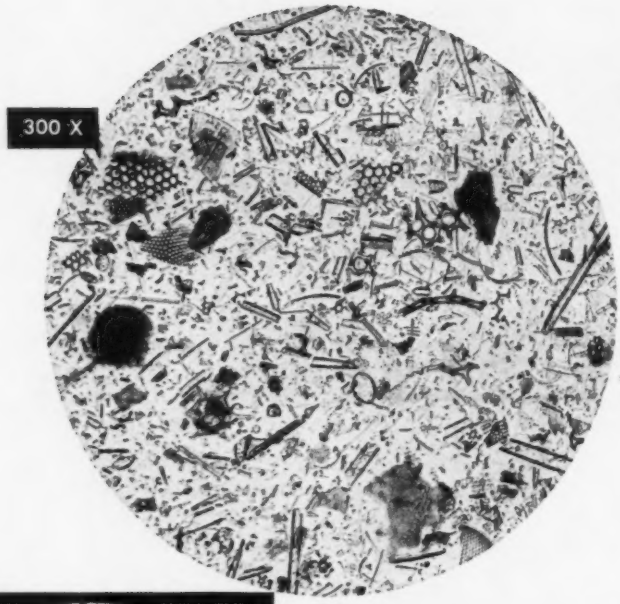
	AMSCO	ANY OTHER SUPPLIER*
Top-quality products.	YES	
Fast bulk delivery service from refineries and terminals in industrial areas.	YES	
Research Laboratory and Special Technical Service group staffed with Chemical Engineers to solve customer problems.	YES	
Ability to make combination bulk solvent deliveries in all markets to effect savings.	YES	
Distributing plants located in over 70 cities, insuring product supply on short notice.	YES	
Over 35 years' experience specializing in Petroleum Solvents.	YES	
Most complete line of Aromatic and Aliphatic Solvents.	YES	
Own fleet of barges, tank cars and transport trucks used exclusively for solvent delivery.	YES	
Sales offices located in 35 industrial areas to provide prompt service.	YES	
"Service Beyond the Sale"—that little bit extra that insures customer satisfaction.	YES	

*Make your own comparison. Fill in answers for any other Petroleum Solvent Supplier.

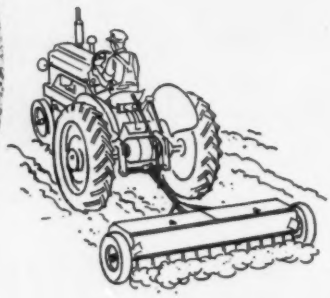
AMSCO

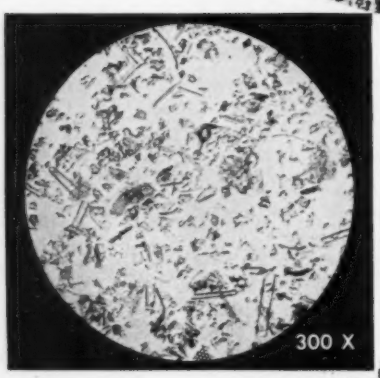
AMERICAN MINERAL SPIRITS COMPANY

NEW YORK • CHICAGO • LOS ANGELES



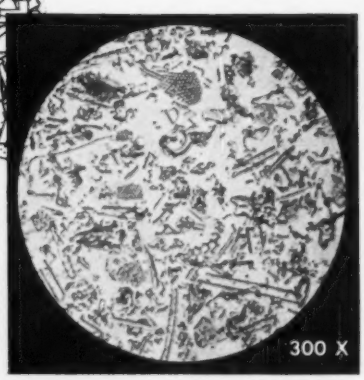
For fertilizer coating—Celite 379, a natural milled diatomite, provides the uniform conditioning needed to prevent caking of granular, mixed or prilled fertilizers—maintains good free-flow characteristics even after prolonged storage.

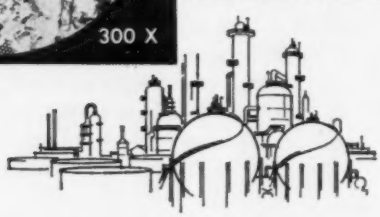




For catalyst carriers—Super Floss, finest particle size flux-calcined Celite grade, is used where a non-reactive porous silica support is needed. (Also available: special Celite supports in many preformed shapes for strength, high temperature stability, resistance to abrasion and attrition.)

As a paint-flatting agent—Celite 281, air-floated fines of flux-calcined diatomite, provides uniform and efficient flatting at low cost. Contributes to control of low angular sheen, durability, and faster drying.





In diatomites, Johns-Manville precision processing works for you

Celite diatomite absorbs its own weight of liquid . . . yet stays 'dry'

No matter which of the many available grades you choose, you can depend on a given volume of inert Celite* to retain its typical dry-powder characteristics even after absorbing its own weight of liquid.

Actually, Celite can absorb a total of more than twice its own weight. That's because a mass of the fine skeletal particles is approximately 93% air space or voids. Yet, in spite of this very high porosity, Celite is essentially non-hygroscopic.

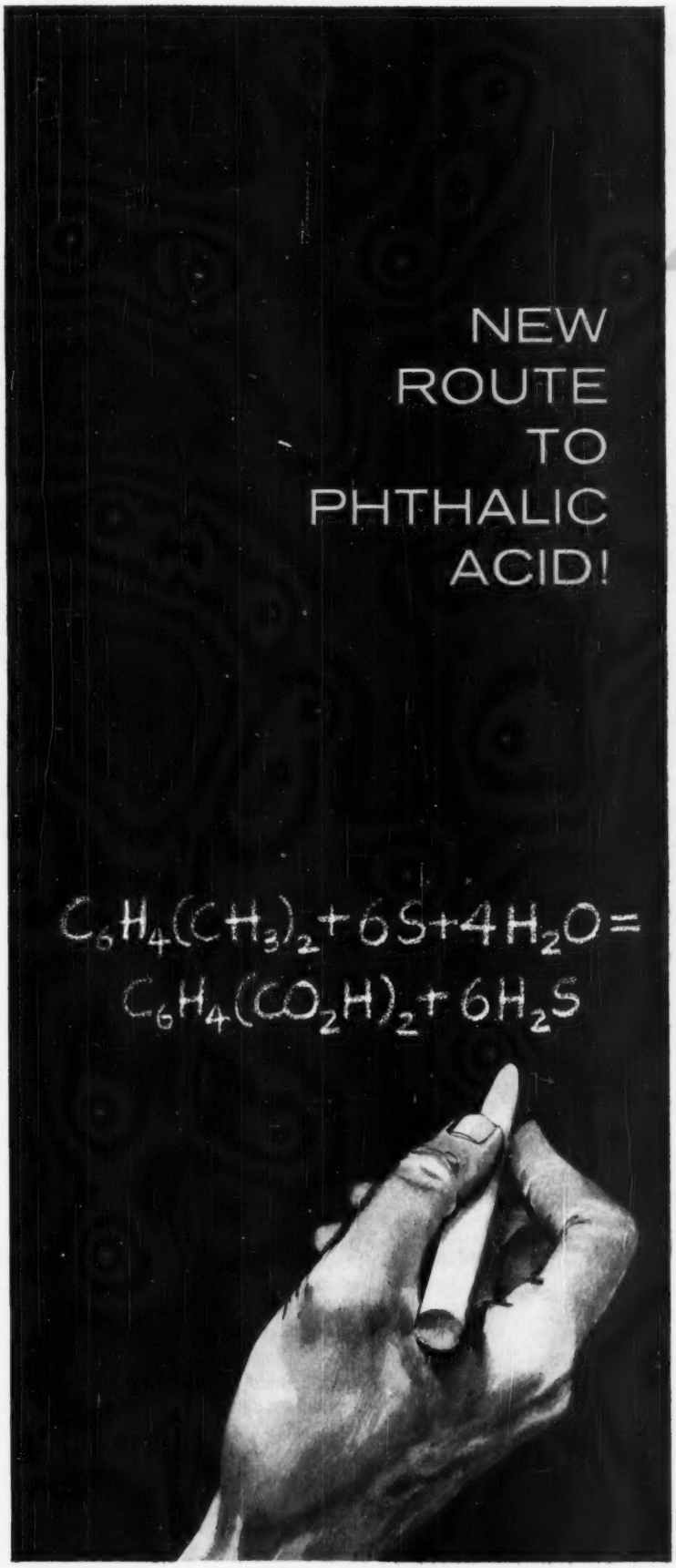
Other unique properties—extremely high bulk, irregular particle shape and large available surface area—ideally suit Celite to hundreds of mineral filler applications. It is produced with precision from the world's purest commercially available diatomite deposit. It offers a wide choice of grades, each carefully controlled for complete uniformity.

For technical data on specific mineral filler or filtration problems, talk to your nearby Celite engineer. Or write to Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

*Celite is Johns-Manville's registered trademark for its diatomaceous silica products

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS



SULPHUR
helps to create headline products

In a report to the Petroleum Division of the ACS, Dr. William G. Toland of the California Research Corporation recently announced the development of a new method for producing Phthalic Acid, with the following over-all reaction:

$$C_6H_4(CH_3)_2 + 6S + 4H_2O = C_6H_4(CO_2H)_2 + 6H_2S$$

Note that the presence of Sulphur right smack in the middle of this reaction is necessary for its completion. The Sulphur leaves the process at this point. The hydrogen sulphide can be oxidized to elemental Sulphur and returned to the initial reaction. It is thus operable in a closed cycle.

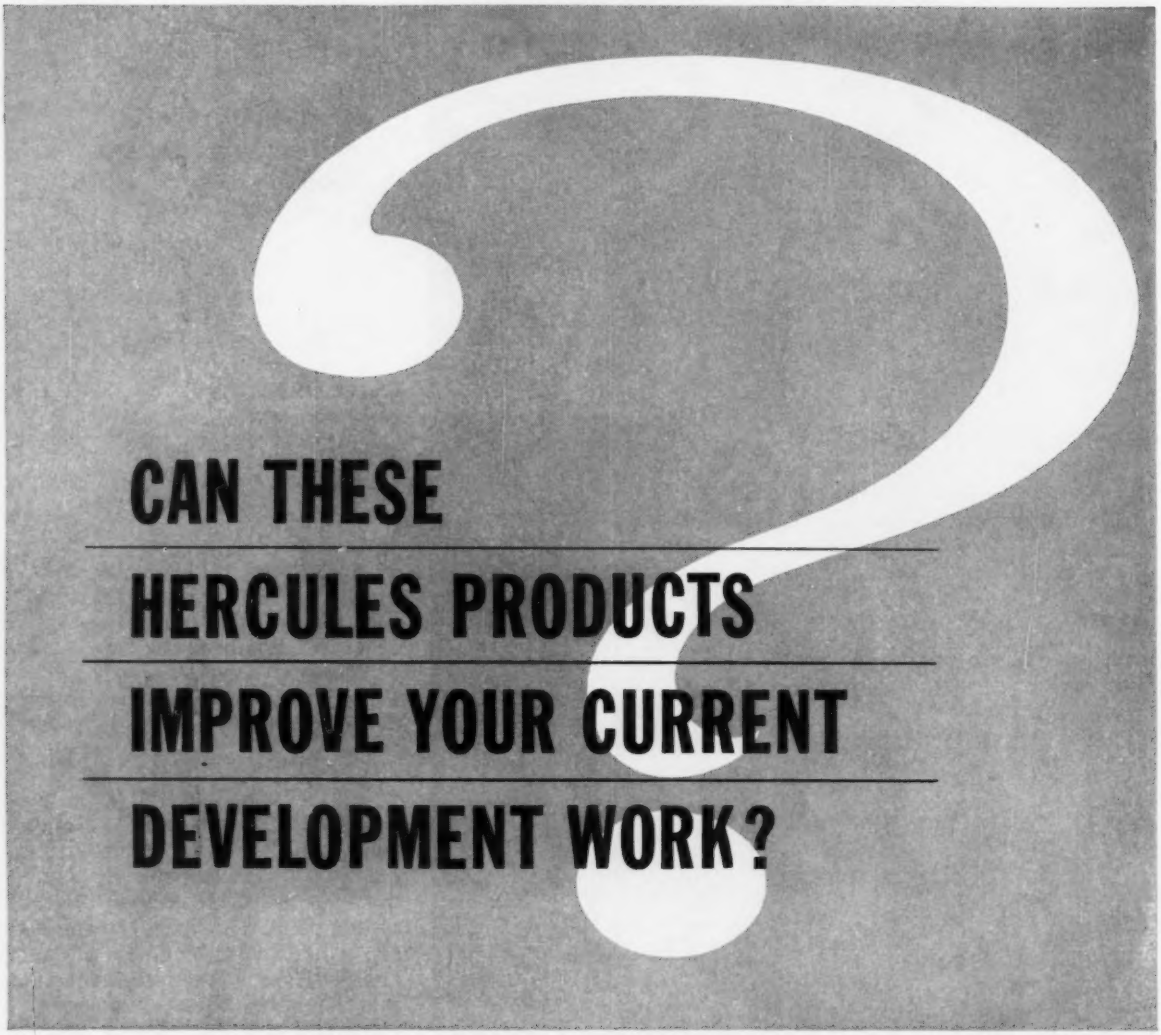
According to Dr. Toland, who developed this new route to phthalic acid, the process is simple and capable of high recoveries.

Here is another good example of how strongly Sulphur is in the processing picture. Together with its many derivatives it enters into countless reactions.

TEXAS GULF SULPHUR COMPANY
75 East 45th Street, New York 17, N. Y.
811 Rusk Avenue, Houston 2, Texas

Sulphur Producing Units: Newgulf, Texas
Spindletop, Texas • Moss Bluff, Texas
Fannett, Texas • Worland, Wyoming
Okotoks, Alberta, Canada

A guide to the new Ceron water-soluble Polymers



Chemically, Ceron® N, N-4E, and N-4S are: Polymeric carbohydrates etherified to give water solubility, physical and mechanical properties, and other desired characteristics.

If you have not seen a copy of the Ceron Product Data Sheet, Number 407-1, we'll be pleased to send one on request.

INDICATED USES

CERON N tape, label, and envelope adhesives
thickeners
sizings
emulsion stabilizers
binders

CERON N-4E (low viscosity, low molecular weight)—
high-solids solutions
stable viscosity
quick-tack adhesives

CERON N-4S (water-soluble thermoplastic)—
heat-sealing adhesives

Virginia Cellulose Department
HERCULES POWDER COMPANY
INCORPORATED
Hercules Tower, 910 Market St., Wilmington 99, Delaware

VX60-2

Performance makes the world of difference

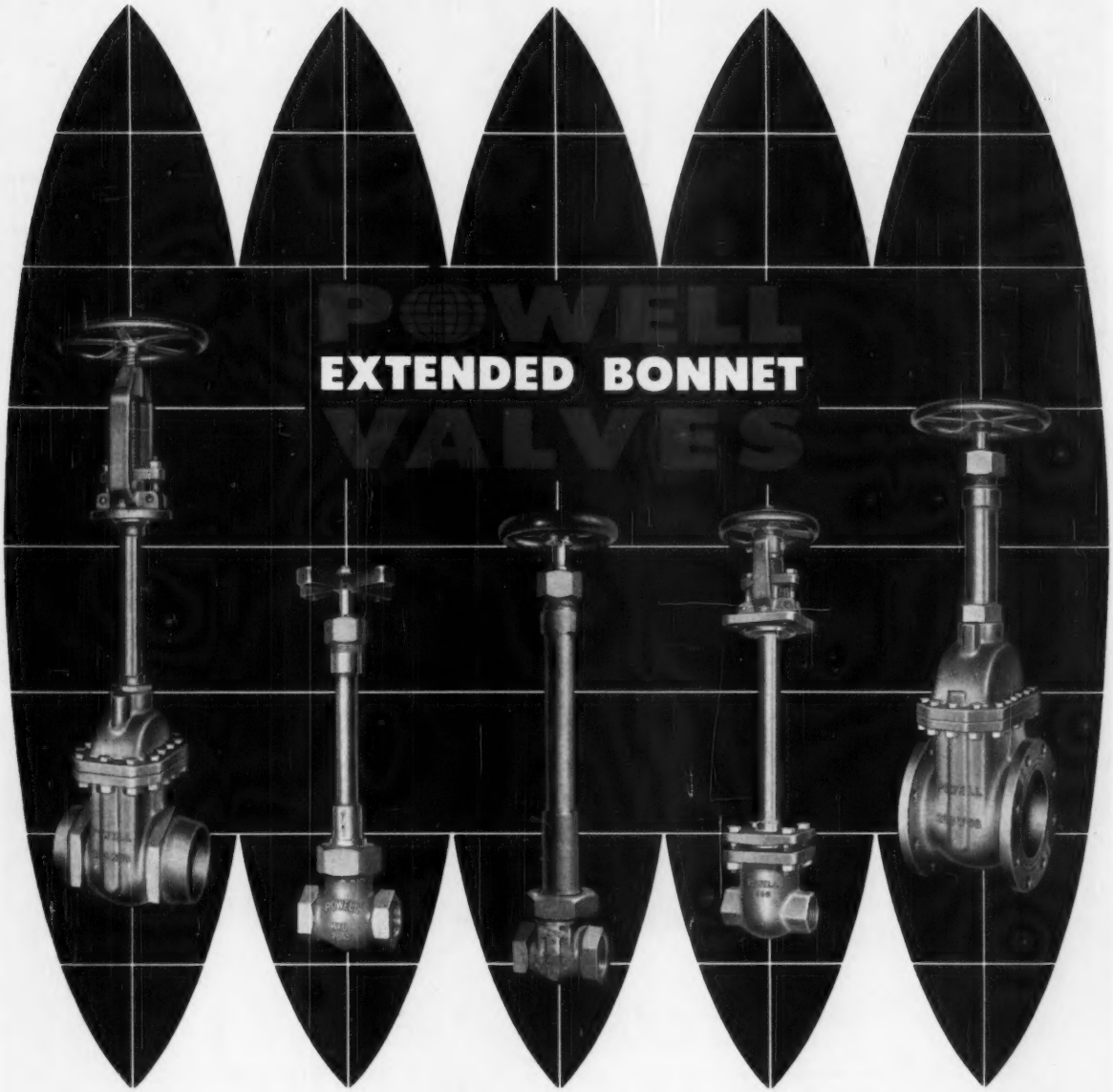


Fig. 70-1413—Bronze Gate Valve for 150 W.P., 200 W.O.G. Outside screw rising stem and yoke, extended bonnet, solid wedge disc, integral seats, socket ends.

Fig. 70-1175—Bronze Hydraulic Regrinding Globe Valve for 2000 W.O.G. Extended bonnet. Hard wear-resisting screwed-in seat ring and disc.

Fig. 70-375—Bronze Gate Valve for 200 W.P. 400 W.O.G. Inside screw rising stem, extended bonnet. Interchangeable solid or split wedge disc, integral seats.

Fig. 70-2490—Stainless Steel Gate Valve for 150 W.P., 400 W.O.G. Outside screw rising stem and yoke, extended bonnet, stainless steel solid wedge disc, integral seats, screwed ends.

Fig. 70-1401—Bronze Gate Valve for 150 W.P., 200 W.O.G. Inside screw non-rising stem, extended bonnet, solid wedge disc, integral seats, flanged ends.

These Extended Bonnet Valves are especially designed to control the flow of liquids and gaseous fluids.

Here are a few of the many valves with EXTENDED BONNET made and recommended by Powell to handle liquid and gaseous fluids—oxygen, nitrogen, helium, hydrogen, etc. They are depended upon for long, uninterrupted, leak-tight service in defense installations to control the flow of the propellant fuels from storage into the missiles.

If you have an unusual flow control problem, or if you want complete information on the Powell Line of bronze, iron, steel and corrosion-resistant valves—our metallurgists, laboratory technicians and engineers are ready to serve you. Just contact your nearest Powell Valve distributor or write directly to us.

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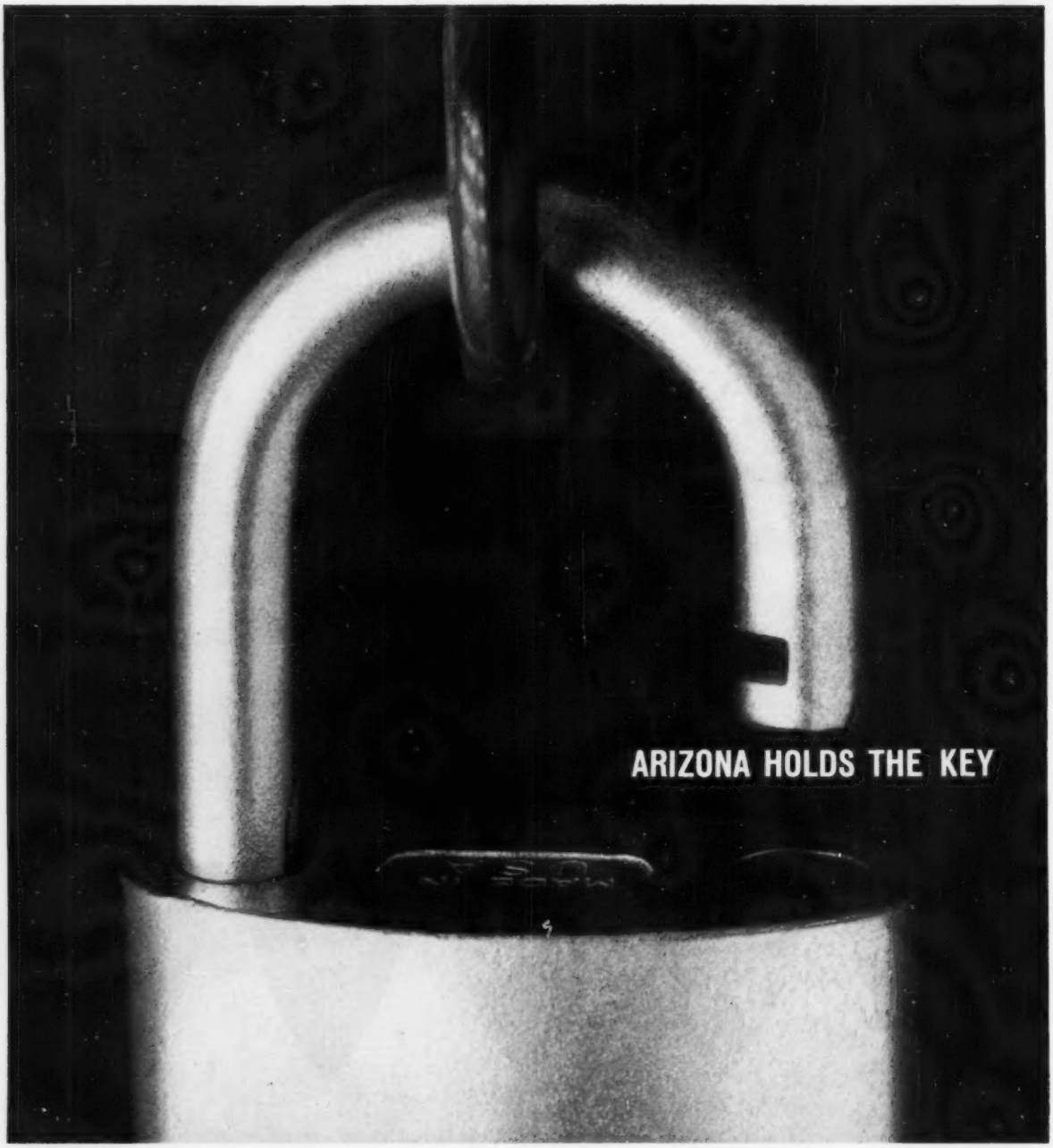

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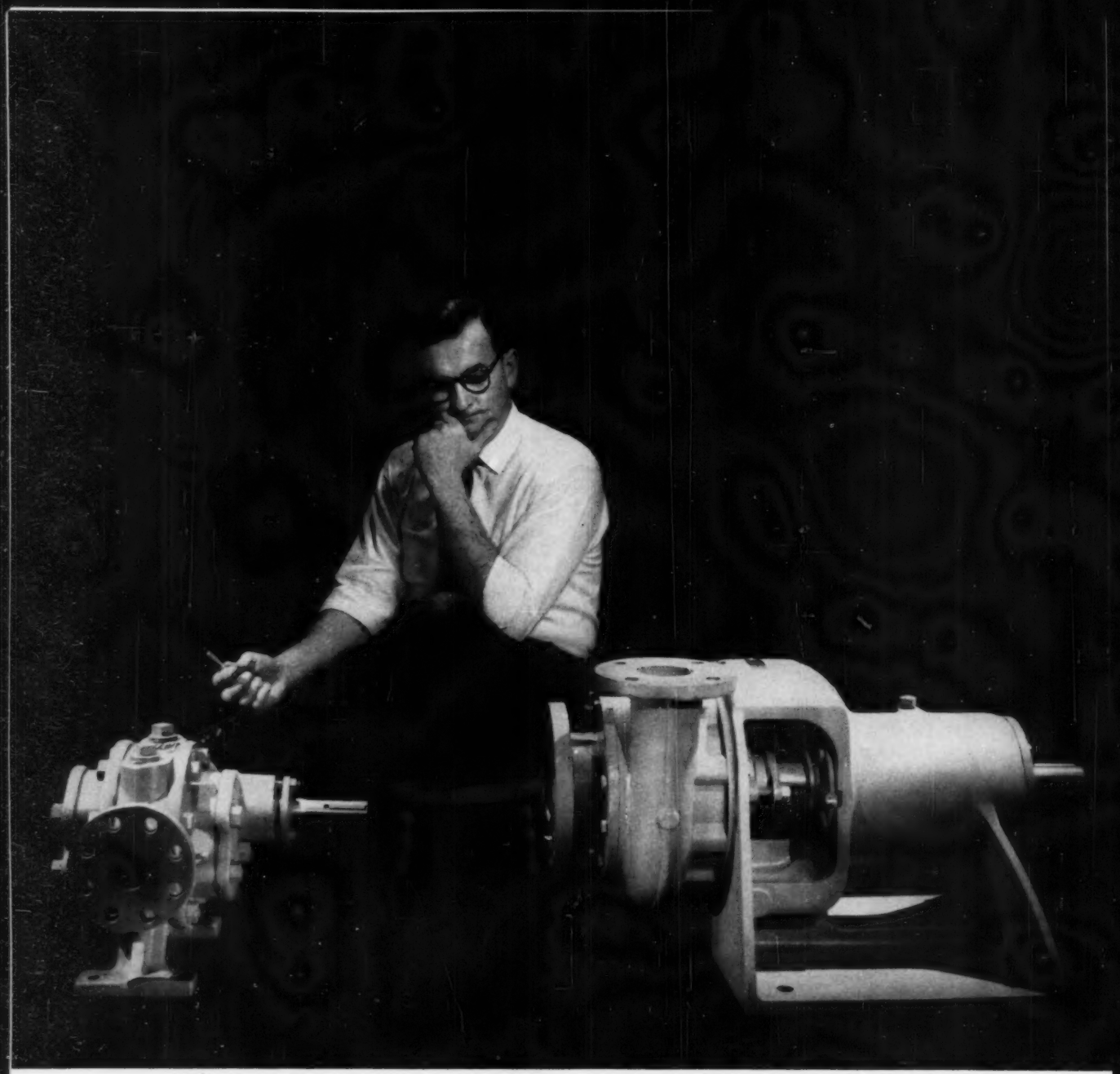

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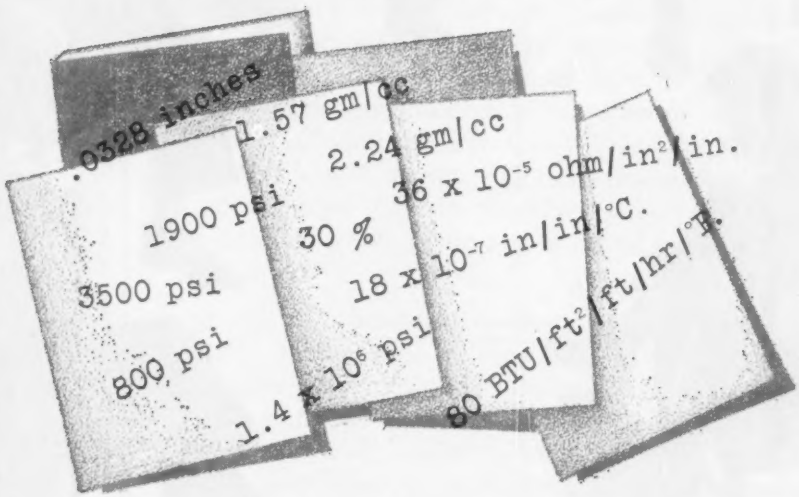

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Business
Newsletter

CHEMICAL WEEK
November 26, 1960

Japanese chemical companies are seeking more U.S. capital to finance their new expansion plans (*see p. 43*). Their quest will probably be eased by the sweeping vote of confidence won by the conservative Liberal Democratic government in last weekend's elections to the Japanese House of Representatives.

Right now, in fact, the business manager of Mitsubishi Chemical is in New York working out an issue of convertible debentures with Kidder Peabody & Co. It will be the first time a Japanese company has offered convertible debentures in the U.S.

The hefty appreciation rates of Japanese stocks have been luring more and more U.S. investors. As a result, for example, Sekisui Chemical (which has started making plastic houses) has sold more than a million shares to U.S. citizens, wants to sell up to 15% of its total stock in the U.S. when its capitalization is increased from $7 million to $10.6 million. Japanese investment brokers in the U.S. look for the Japanese government to spur more U.S. investment. It's expected to allow about 20 major companies to issue American depositary receipts, which would allow U.S. investors immediate repatriation of capital invested in Japanese stocks.

•

U.S. know-how continues priming Japanese chemical industry growth, meanwhile. In the latest of many similar deals, Parke, Davis has formed a joint subsidiary with Sankyo Kabushiki Kaisha, a large Japanese producer that has been distributing Parke, Davis products, and manufacturing some under license. Under the net setup, Sankyo's plant will turn out "a wide range" of Parke, Davis antibiotics, vitamins, hormones and steroids, primarily for the Japanese market. Name of the 50-50 subsidiary: Parke Davis & Sankyo Kabushiki Kaisha.

•

Mexico's forthcoming mining law will be milder than many industry men had feared. National Patrimony Minister Eduardo Bustamente revealed last week that the government will offer "incentives" to companies that take on Mexican capital but will not directly penalize companies that don't. It will also halt the payment of "regalias" (royalties) on concessions, limit the time that concessions may be held, take back concessions not worked within a given time limit, and insist on complete knowledge of contract terms before granting concessions.

•

As new capacity comes in, some old is leaving. This week two 50-year-old plants, obsolete and in the wrong places, were given death warrants.

• Atlas Powder Co. will close its Senter Plant near Houghton, Mich., Dec. 16. The plant's dynamite operations will be consolidated at Atlas's Missouri and Pennsylvania plants. Reason: replacement of dyna-

mite by ammonium nitrate in the industrial explosives market (*CW Business Newsletter, Sept. 24.*)

• New Castle Chemical Co. (New Castle, Pa.) will cease its business of supplying sulfuric acid to the Youngstown district steel industry. While nationally the steel industry has been operating at 52% of capacity, in the Youngstown area it has been operating at only 32%. The plant isn't worth remodeling, officials say.

New Castle's parent, Matthiessen & Hegeler Zinc Co. (La Salle, Ill.), is at the same time going into full production this month at its new Port Maitland, Ont., sulfuric acid plant (*CW, July 11, '59, p. 27*), to be operated by M & H subsidiary Sherbrooke Metallurgical Co. Ltd. It will be a zinc sulfide roasting unit.

•

New Canadian sulfuric capacity might also result from a tripling of International Nickel's Copper Cliff iron ore recovery unit near Sudbury, Ont. Inco claims to be striving toward maximum utilization of all elements contained in the ores, also claims "encouraging results" for a pilot plant to reduce roaster sulfur dioxide with natural gas. Matthiessen & Hegeler says that if it had known about the Inco developments two years ago "it would have given us pause," but that there are probably enough acid markets in Canada to go around.

•

The first source of titanium dioxide west of the Mississippi will be in production the latter part of '62. American Potash & Chemical Corp. (Los Angeles) and LaPorte Titanium Ltd. (London) will build a 25,000-tons/year, $15-million plant at an as-yet-undetermined location in southern California. LaPorte, one of the two largest producers of titanium pigments in the United Kingdom, will provide process information and know-how, will own 15% of the new enterprise. American Potash, 85% owner, will handle construction and operate the plant.

•

U.S. industry will, after all, have a voice at the GATT session on tariff cutting in Geneva this winter. Reversing its policy after loud industry criticism (*CW, July 23, p. 22*), the State Dept. has decided that 12 public advisors will be picked by government agency trade policy officials to accompany the official bargaining team to Geneva, representing the broad fields of industry, agriculture, labor and consumers. A corps of "consultants" will also be picked, bringing the total nongovernmental advisory group to as high as 70. The consultants will stay in Washington.

•

Nylon scores another blow in its battle against rayon for the tire-cord market (*CW, Nov. 5, p. 100*). American Enka—one of the largest producers of tyrex rayon tire cord—will beef up its nylon 6 capacity by 70% in the largest single expansion of its Enka, N.C., operation since the original rayon plant went up there in '28. Greater output of nylon tire cord is a major objective of the expansion—but Enka will be producing the Tyrex product.

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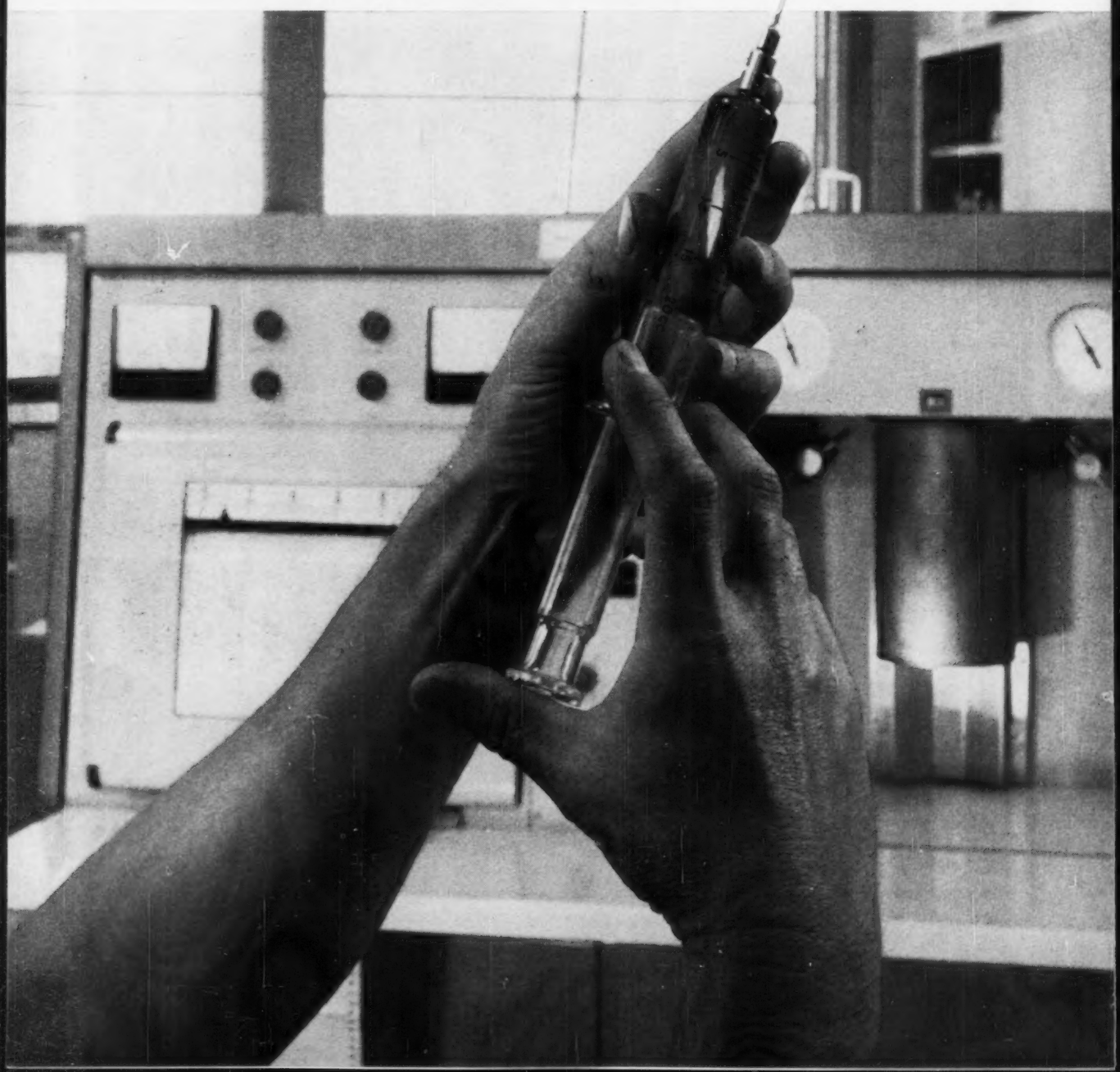
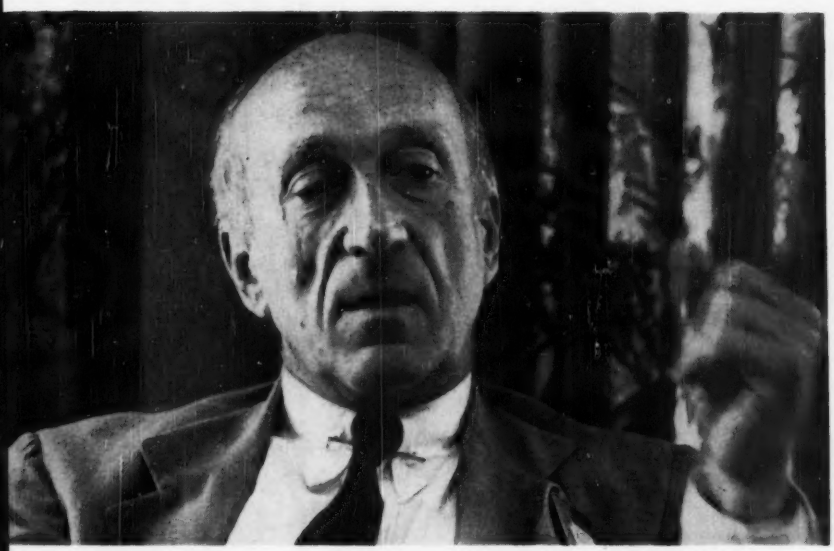




Brush's Mikhalapov: New encouragement for domestic ore seekers.

Bullish on Beryllium

With rising confidence that U.S. demand for high-purity beryllium metal will triple within this decade, companies producing—or planning to produce—the ore and the metal are displaying faster footwork this week.

Newest developments:

• Beryllium Resources and Dynamic Metals—both of Los Angeles—have decided to merge. BR—active in prospecting for beryllium ores—will be the surviving company. Dynamic has developed the Van Dornick flotation process for concentration of beryllium minerals.

• Brush Beryllium (Cleveland)—a leading U.S. producer of beryllium metal, alloys and fabricated products—will buy an equity interest in BR. And President G. S. Mikhalapov (*above*) says he will look to this company as a possible source of up to 50% of Brush's near-future ore requirements.

• General Astrometals (Yonkers, N.Y.) will become the third beryllium fabricator in the U.S., with a license to use beryllium flake and powder—and also technological know-how—from Pechiney (Lyons, France). It finds itself in a ready-made market but overshadowed by the country's two present producers and fabricators, Brush and Beryllium Corp. of America (Reading, Pa.).

• Beryllium Corp., according to trade reports, may be carrying out an expansion program parallel to the one being undertaken by Brush—namely, to double its beryllium metal capacity by next year. But company President Walter Lowry will admit no more than that his firm has "accelerated" its multimillion-dollar expansion plan launched in '59.

Betting on a Breakthrough: What's behind the new burst of activity? Sources close to both the industry and the U.S. government are predicting domestic production of as much as 500 tons/year of beryllium metal by '70—about three times the current clip. A few beryllium specialists edge even further out on the limb and add that if a significant breakthrough in applied beryllium research should occur in '61 or '62, that market potential could be realized by as early as '65.

Sustaining that possibility are the constantly increasing sums being plowed into beryllium research and development work. Between the U.S. Air Force and the Atomic Energy Commission, the government outlay for this purpose is now running about $2-3 million/year, and the beryllium industry is investing at about the same rate.

At the same time, extensive efforts are being made in prospecting for domestic ores and processes for milling and refining those ores. Just last week, the government reported discovery of "widespread beryllium mineralization" in the Yellow Jacket Mountains of central Idaho, about 80 miles north of the Sawtooth Mountains where beryllium was discovered last August. The newly found ore was said to be of high BeO content.

Galloping Growth Possibilities: Consultant James A. Barr, Jr., chemical engineer and metals specialist in Washington, D.C., estimates that U.S. consumption of beryl—or beryl-equivalent if low-grade ores are successfully mined and processed—will increase by about 2,000 tons/year. Consumption last year stood at more than 8,000 tons—nearly double that of '57—and by Barr's reckoning will hit 15,000 tons/year in '65 and 25,000 tons by '70.

Barr regards these as "conservative, generally agreed on" estimates, and suggests that accelerated programs for military and space aircraft could cause a stepped-up demand for 10 to 20 times those amounts. This, Barr concedes, would require solving many of the use problems, including what is perhaps the toughest one: lack of ductility of the metal. The pure metal would then lend itself to structural applications that heretofore have been out of reach. Barr thinks that since '61 and '62 are shaping up as big years for beryllium development, some of the answers may be turning up soon.

Another conceivable market for beryllium is in high-energy fuels. Beryllium hydride has an even higher heat of combustion than the boron hydrides currently under study as propellants. Two obstacles to this use: toxicity and availability.

But most of the government's beryllium research funds have gone into

Vitro's Hotchkiss extends beryllium prospecting into the Southwest.

work on use of the metal in rockets and nuclear reactors. While a pound of beryllium metal now sells for about $60, when it is fabricated into a missile part its value can soar to more than $1,000. For this reason, the price of the metal is not considered a significant factor in growth of this market. Even at $60/lb., the use of beryllium in missiles and space craft is more than justified by the savings in payload equivalent, according to authorities such as Charles Giemza, metals research scientist with The Martin Co. (Baltimore). He foresees a possible future use of up to a ton of beryllium per vehicle.

More Consolidations Ahead? Right now, numerous U.S. companies are more or less active in various aspects of beryllium ore and metal development. But the coming merger of Beryllium Resources and Dynamic Metals seems to indicate that the roster is likely to shrink as the result of mergers, acquisitions, and decisions to pull out if ore claims don't prove.

The BR-Dynamic consolidation — long expected by industry men — brings under one management BR's extensive pegmatite holdings and the Van Dornick froth flotation process designed to recover more than 90% of the beryllium oxide in low-grade ores. When negotiations are completed Brush will have two representatives on BR's board of directors; and the three other owners will be E. Van Dornick, inventor of the separation process; and the two Salt Lake City companies that originally set up BR—Federal Resources, a mining and milling concern; and Hidden Splendor Mining Co., a subsidiary of Atlas Corp. BR plans to test the process in a 250-500-tons/day mill to be built next spring and summer near Delta, Utah.

Brush—now reportedly turning out 14,000 lbs./month of beryllium metal —is pushing a $6-million expansion that would raise its metal capacity to nearly 30,000 lbs./month by next July. Mikhalapov has indicated he will give BR a chance to supply up to 50% of Brush's ore needs, starting late in '61, if BR is able to deliver. BR—while never really defining the upper or lower limits of its proposed beryllium concentrate production—has hinted that it hopes to sell its output to both Brush and Beryllium Corp.

Last week's licensing agreement with General Astrometals enables Pechiney—only Western-nation beryllium producer other than the U. S. turning out sizable quantities of the metal—to extend its sales area to this country. G.A.—formed last month by a trio of executives from Sylvania-Corning Nuclear—initially will market Pechiney beryllium products. Later it will produce its own hot-pressed and vacuum-cast billets, plates and extrusions (including tubing)—all from Pechiney flakes, powder, and semifinished shapes.

Prospectors Aplenty: Within the past year, dozens of companies and individuals have gone into beryllium prospecting—often with an eye to speculation.

Vitro Minerals—one of three companies operating under Office of Mineral Exploration contracts, whereby the government helps with the financing—is expanding its prospecting activities into Utah and the Southwest, according to Vice-President Eugene Hotchkiss. He figures it will probably take another year before Vitro can fully evaluate its ore bodies. Lithium Corp., now drilling near Custer, S.D., and Tri-State Metals, prospecting in Taos County, New Mexico, have the other two OME contracts. Several additional contracts are pending.

Even the most conservative beryllium experts see a solid growth ahead for this light-weight metal—not just a peak or plateau, but a steep rise in output and use. Beryllium, they are convinced, "just can't fall into a trap as titanium did."

Montecatini Pushes

Montecatini's current expansion program accelerated last week following approval of several new projects at a board of directors meeting at company headquarters in Milan, Italy. Montecatini is now moving ahead with 20 plant projects in seven nations.

The company's first U.S. plant—a 25-million-lbs./year polyolefin resin plant being built at Neal, W. Va., by Novamont Corp., a wholly owned subsidiary—is scheduled to go onstream next March.

New projects in Italy include plans to triple capacity for fluorine derivatives at Spinetta Marengo; doubling capacity for potash fertilizer at Porto Empedocle; major expansion of the recently acquired Vetrocoke glass plant near Venice; and "continual expansion" of the petrochemical plant that recently went onstream at Rho, near Milan.

Montecatini has started up a second polypropylene resin unit at Ferrara, is constructing a third unit there that will bring resin output to 45 million lbs./year, and has started up at Terni its first commercial units for polypropylene film and fiber.

Biggest single chemical project under way is the petrochemical complex at Brindisi, which will process 1.5 million tons/year of crude petroleum. Onstream date: early '62. It will have its own power plant.

A new phthalic anhydride unit went into operation last month at Cengio, and a diammonium phosphate plant is due onstream soon at the Porto Marghera works. And after this week's scheduled startup of a natural gas pipeline from the Cellino field, Montecatini will expand its Bussi plant to convert the gas into petrochemicals.

Other current Montecatini projects in Italy: at Codogno, a new plant to produce organic chemicals for use in varnishes and related products; at Priolo, in Sicily, a synthetic ammonia plant; at Linate, new units to increase production of Aspor fungicide to 25,000 metric tons/year; at Spinetta Marengo, increasing titanium dioxide capacity from 18,000 to 40,000 metric tons/year; and at Vetrocoke, a new urea plant. Still other projects are in the works in Austria, France, India, the Netherlands and Peru.

Perkin Medal to Prutton

Carl F. Prutton, a veteran of nearly 40 years in the U.S. chemical industry as consultant and executive, has been elected to receive one of the highest awards in the chemical field: the Perkin Medal. This award will be presented at the annual Perkin Medal dinner of the Society of the Chemical Industry, American Section, next Feb. 3 at New York's Waldorf-Astoria Hotel.

Prutton was executive vice-president of Food Machinery and Chemical Corp.'s five chemical divisions when he retired last June. He had served as research director and vice-president with Mathieson Chemical prior to the '54 Olin Mathieson merger; as consultant for Dow Chemical, Dowell and Lubrizol; as chief of process development in the government's wartime synthetic rubber program; and as head of the Dept. of Chemistry and Chemical Engineering at Case Institute. He has been granted about 100 patents.

Acetylene Appraisal

U.S. experts in acetylene research and production express general agreement with a Dept. of Commerce report released last week on an alleged Soviet lag in acetylene development. But they warn that concluding from this that the whole Russian organic chemical industry is backward could be dangerous and misleading.

Prepared by an unnamed U.S. government organization (said to be the Central Intelligence Agency), the report winds up: "The Soviets have not gone as far as the more scientifically advanced nations of the West in providing a sound organic chemical industry."

Organic chemistry men here say this point is too extreme. Reason: acetylene research is far from the whole picture.

"The report is a little overstated," says acetylene authority Charles Marsel of New York University's Chemical Engineering Dept. "Saying backwardness in using acetylene means retarded progress in an entire organic industry is a dangerous extrapolation.

"You can do a lot with ethylene," he explained, "and that's what the Russians will probably do."

Another chemical engineering professor, recently back from Russia, cautioned: "The question is: Where did they get the information?"

Commenting on Russian lack of "sophistication in applying their knowledge," another conclusion in the government report, Vice-President Jesse Werner of General Aniline & Film Corp. says the real sophistication in production comes from experience; and that experience comes only from production. Because they started relatively late in this field, the Russians' basic problem, notes Werner, is knowledge in chemical engineering. In that, the Communist organic industry definitely is now behind America.

Jump-off point of the report, "backwardness of the U.S.S.R. in fully exploiting the conversion of their vast stores of oil and natural gas through the acetylene route," was accepted without argument.

George Brown, biochemist at Sloan-Kettering Institute, agrees that in biochemistry and microbiology the Soviets have not shown much originality. Brown, who visited the U.S.S.R. a year ago, points out that he could not speak for the Commerce Dept.'s statements on acetylene.

Adds Marsel: "The published stuff coming out of Russia on acetylene has been pretty routine. They've been grinding along following German work without much originality. On the other hand, what original work has the U.S. done in acetylene lately? We're still using findings of the Sachse process, yet it does not mean our acetylene industry is not expanding."

According to Werner, Russia is held back by "scientific political" beliefs. Soviet industry tends to use methods of its own discovery, even if outmoded. Again, he points out, this might not always be the case.

The End Is Nearer

Century Chemical Corp. last week received permission to stay in operation for another 30 days (*CW Business Newsletter, Nov. 19*). This enables Century and its affiliate, Chemo Puro Mfg. Corp., adjudged bankrupt, to continue selling manufactured materials already on hand. Last week Trustee Donald Vincent asked Federal Referee Herbert Lowenthal for a sale order that could lead to liquidation.

Hercules' Evans: From a converted plant, a search for fiber markets.

Forward with Fibers

Hercules Powder—first U.S. producer of polypropylene resins—this week "integrated forward" by forming a Fiber Development Dept. aimed at evaluation and development of markets for polypropylene staple and filament yarns. Its manager: Forest Evans, previously assistant general manager of the company's Virginia Cellulose Dept.

This development came on the heels of reported negotiations earlier in the week between Hercules and Industrial Rayon Corp. for purchase of IRC's Covington, Va., nylon and rayon plant. Here's how Hercules plans to tie together its new department and the Covington plant:

The company will convert the nylon section of the Covington operation to the spinning of polypropylene fibers —with more than 10-million-lbs./-year capacity. But the facility will not turn out heavy-denier monofilaments.

Instead, the converted plant will be used to produce textile staple and continuous multifilament yarns from the firm's Pro-fax crystalline polypropylene. Here the development department enters the picture. As the name indicates, it is a development group, distinguished from the company's eight operating departments.

Hercules, which has one major polypropylene manufacturing facility at Parlin, N.J., and another on the way at Lake Charles, La., says it will not enter the rayon or nylon fields.

	SALES*		EARNINGS*	
	Nine months 1960	*Change from '59*	*Nine months 1960*	*Change from '59*
CHEMICALS AND DRUGS				
Chemical Process	4.8	Up 22.4%	0.3	Up 3.1%
Chemetron Corp.(1)	100.8	Up 3.0%	3.6	Up 27.6%
Columbian Carbon	60.9	Up 10.2%	5.3	Up 2.3%
Devoe & Raynolds	50.2	Up 6.3%	1.9	Up 1.8%
Engelhard Industries	95.7	Up 8.2%	2.2	Down 10.3%
Lilly, Eli	135.1	Down 4.9%	15.6	Down 15.6%
Minerals & Chemicals Philipp(2)	———	———	6.2	Up 3.6%
Pittsburgh Coke & Chemical	49.7	Down 1.7%	1.4	Down 29.3%
Smith-Douglass	———	———	0.4	Down 32.1%
Stepan Chemical(3)	16.5	———	0.9	———
Witco Chemical(4)	45.4	Up 5.0%	1.8	Up 8.3%
LIGHT METALS				
Aluminium Ltd.	380.2	Up 20.3%	32.0	Up 109.7%
Aluminum Co. of America	657.6	Up 2.3%	30.3	Down 27.0%
Kaiser Aluminum & Chem.(5)	313.6	Down 2.9%	15.7	Up 3.3%
Reynolds Metals	330.1	Down 9.9%	19.1	Down 39.3%
Four-company totals:	**1,681.4**	**Up 2.0%**	**97.0**	**Down 6.1%**
Beryllium Corp.	17.1	Up 9.3%	1.1	Down 3.2%
Brush Beryllium(6)	20.5	Up 45.4%	1.5	Up 37.4%
Two-company totals:	**37.6**	**Up 26%**	**2.6**	**Up 16.6%**

* Dollar figures in millions. (1) Equities in earnings of foreign operations and 50%-owned companies are now consolidated with company's domestic earnings. Earnings for '59 period do not include $977,495 capital gain. (2) Including, in both '59 and '60 periods, the operations of Philipp Brothers, Inc., and Philipp Brothers Ore Corp., which merged with Minerals & Chemicals Corp. July 21, '60. Sales data not reported. (3) Data for '59 period do not include operations of Maywood Chemical Works prior to merger May 1, '59. (4) Not including operations of Sonneborn Chemical and Refining Corp., acquired July 28, '60. (5) Earnings for '60 period do not include $1.8-million special credit from income tax adjustment. (6) Third-quarter sales data estimated by **CW**.

Escaping the Profit Squeeze

Although most chemical process companies are hit by the cost-price squeeze in which—as Du Pont puts it—"the hardest thing to make is a profit," notable improvements in earnings are being declared by companies in two categories:

(1) Companies that have branch operations in certain foreign nations.

(2) Companies that have established themselves in certain new and fast-moving product lines.

Aluminium Ltd. is a prime example of the first category, with sharp gains in both sales and earnings—contrasting with setbacks for the three other largest aluminum producers on this continent. Aluminium's gains, says President Nathanael Davis, are "attributable to the strong demand for aluminum products outside North America." For most of the year to date, he adds, the company's Canadian ingot facilities were running at nearly 90% of capacity.

Other CPI companies cashing in on overseas business booms: Chemetron, with profits on foreign operations up 49.8%; Eli Lilly, with foreign gains helping to offset domestic declines; and Sherritt-Gordon Mines, for which the soaring world demand for nickel helped to boost third-quarter sales 15% higher than second-quarter volume, despite a seasonal drop in fertilizer sales. With sales outside the U.S. showing "an encouraging increase," Lilly is continuing to expand abroad; currently the company is planning to add manufacturing plants in West Germany and Venezuela.

Two firms in the second category are Brush Beryllium and Beryllium Corp. (*see p. 39*). Another is Volk Radiochemical Co. (Chicago), now starting its sixth year of operation. Its research chemicals and radioactive pharmaceuticals lines have been thriving particularly well. In its fiscal year ended Aug. 31, sales jumped 51.5%, to $416,585, and earnings rose nearly fourfold, to $18,641.

The slow pace of the steel industry hurt Pittsburgh Coke & Chemical by putting a big dent in its major market and also causing shortages of some of Pitt Coke's principal raw materials. But the company's '60 sales and earnings dips would be much more serious if it weren't for the company's diversifications into activated carbon and concrete pipe. Shipments of those products, says President Henry Hillman, are going strong.

For 'Sour Gas' Sulfur

Sulfur production in Canada is slated for a substantial increase in '62 as the result of a $13-million plant construction contract awarded last week by Jefferson Lake Petrochemicals and Mobil Oil of Canada.

These companies—affiliates of Jefferson Lake Sulphur (New Orleans) and Socony Mobil Oil (New York)—have commissioned Ralph M. Parsons Co. to build a plant on a site 15 miles northeast of Calgary, Alta., for processing "sour gas" from the East Calgary natural gas field.

Initially this jointly owned plant will be designed to process raw gas at rates up to 150 million cu.ft./day. Annual output: 285,000 tons of sulfur, 700,000 bbls. of condensates, 36.5 billion cu.ft. of dry gas.

The sulfur is to be sold in domestic and world markets, with export shipments to go out through the Port of Vancouver, B.C., where Vancouver Wharves Ltd. has recently completed a bulk loading terminal already being used for shipments from Jefferson Lake's three-year-old sulfur recovery plant at Peace River, B.C. (capacity 155,000 long tons/year).

Construction of the new plant is to begin "immediately" and is to be completed by next November. The Canadian Pacific Railway has already started building a 3.7-mile spur line to the plant site.

Raw natural gas will be provided by Westcoast Transmission Co., which will collect gas from some 30 producing companies in the 200-sq.-mile East Calgary field, sell it to the new plant's owners for processing, and then buy back the dry gas for sale in the Pacific Northwest and California markets.

Sold on Gases

American Cryogenics (Augusta, Ga.), a small but growing factor in industrial gases, is on the move again. This time the three-year-old company —which already has seven acquisitions under its belt—is aiming at growth through plant expansion.

The firm describes itself as one of the 10 largest U.S. producers and distributors of industrial gases and one of the two largest U.S. manufacturers of acetylene cylinders. Now it's preparing for a public stock offering that it hopes will raise at least $1.5 million in new capital. It has filed a statement with the Securities & Exchange Commission for registration of 150,000 new shares of common stock; if these are registered and sold, the company's number of outstanding shares will be 592,986.

If the stock offering nets at least $1.5 million, the firm can obtain a five-year, $1.74-million term loan from Citizens & Southern National Bank (Atlanta) and Bank of America (San Francisco). About $1.3 million of the new equity capital will be used for expansion of liquid oxygen production and distribution facilities; the rest will be added to working capital. Of the bank loans, $627,000 will go into working capital and the remainder will be used to retire promissory notes.

American Cryogenics took this name last Aug. 1. It had been formed as Marks Oxygen Co. in '57; but its founder, Pierce E. Marks, Sr., had been in the business since '45. He still heads the company and apparently has an eye on further diversification moves—possibly including liquid hydrogen, eventually.

Acquisitions to date: Alabama Welding Supply Co. (Gadsden, Ala.); McKesson Appliance Co. (Toledo, O.), manufacturer of medical and dental equipment; Coyne Cylinder Co., Acetylene Cylinder Corp. and Farwest Equipment Corp. (South San Francisco), manufacturers of high-pressure gas cylinders; Sierra Oxygen Co. (Reno, Nev.); and Florida Oxygen Manufacturing Corp. (Orlando, Fla.).

Pro forma, consolidated sales of the company reached $5.1 million in the fiscal year ended last July 31, with earnings of $335,125. Earned surplus rose to $1.3 million.

Japan's Petrochemical Plans

(All data in tons/year. Source: Japanese Ministry of International Trade and Industry.)

	Present capacity	Capacity to be added by '63	Total estimated '63 demand*
Acetaldehyde	134,700	125,000	245,000
Octanol	25,000	23,000	40,900
Acetone	20,100	25,000**	47,000
Acrylonitrile	26,000	32,000	50,000
Butanol	37,300	33,000	60,400
Ethylene oxide, glycol	23,600	11,800	29,900
Polyethylene	82,000	100,500	160,000
Styrene monomer	53,000	29,000	80,000
Toluene, xylenes	5,000†	30,000	30,000

* Including exports. ** Additional projects expected to be approved later. † Not yet on stream.

For Japan: Growth by Plan

Total Japanese capacity for a dozen principal petrochemicals will be virtually doubled by '63 under private industry plans that last week received formal approval from the government's Ministry of International Trade and Industry (MITI).

This clearance gives the green light for 25 plant construction and expansion projects in what is called the second-stage growth of that country's petrochemical industry.

Last spring MITI had weeded out millions of dollars worth of proposed petrochemical projects (*CW, May 28, p. 28*); and last week's action included several directives to cut back on the size of some proposed expansions and to undertake others only if certain older plants are to be closed down. It's an example of how the Japanese government regulates industrial expansion in an effort to conserve manpower, materials and capital.

MITI says last week's action was based on these policies:

(1) To increase naphtha-cracking capacity so that the price of ethylene and propylene may be reduced to 40 yen/kg. (about 4.9¢/lb.).

(2) To promote greater utilization of those olefins.

(3) New plant proposals to be approved if and when the production capacity can be proved to be "economical on a competitive basis."

(4) Introduction of foreign technology to be limited to that which has reached commercial production.

(5) To accelerate the switch from conventional chemical manufacturing to petrochemical operations.

(6) To establish combines that would coordinate the scrapping of outmoded equipment and the construction of new plants.

The new round of expansion, it's estimated by the Japan Petrochemical Industry Assn., will bring the industry's invested capital total from $230 million at the end of '59 to about $840 million by '63.

In polyethylene, producing companies had asked for approval on projects that would have increased Japanese capacity 125,500 tons/year; but MITI considered that excessive for '63 demand estimated at 160,000 tons, including 15,000 tons for export sales.

Approved polyethylene projects: Sumitomo Chemical, 24,000 tons/year; Mitsubishi Petrochemical, 25,000 tons; Mitsui Petrochemical (joint venture with Du Pont), 24,500 tons; and Nitto Chemical (joint venture with Union Carbide), 27,000 tons. Although cleared by MITI, the two joint ventures with U.S. concerns are still subject to final approval from Japan's Foreign Investment Council.

Styrene producers wanted to boost capacity 56,000 tons/year; but MITI approved only an 11,000-tons/year project for Mitsubishi Petrochemical and an 18,000-tons/year expansion for Asahi-Dow.

The approved plan for making ethylene and propylene more plentiful calls for three new cracking units with capacity of 120,000 tons/year.

rapid roundup

Rounding out the week's news of companies, expansions, and foreign developments.

companies

Sunray Mid-Continent Oil Co. (Tulsa, Okla.) is extending its operations into Mississippi with the purchase of Geyer Oil Co. (Greenville, Miss.). In addition to its 16 service stations and six bulk gasoline plants, Geyer deals in liquefied petroleum gases.

Purex Corp. (South Gate, Calif.) will increase its authorized preferred shares from 40,000 to 100,000. No shares have been issued yet, but the company wants "to be prepared for opportunities arising in the future," either to sell preferred for cash, or use it as part of the purchase price of an acquisition.

Dixie Fertilizer Co. (Meridian, Miss.) has purchased International Guano Co. (Ingram, Tex.), which holds leases on southwest Texas lands reportedly containing more than 200 million lbs. of guano worth $1/lb. retail. Dixie plans to mine and process the guano in Texas, ship it to the company's just-completed fertilizer plant in Meridian for marketing under the tradename Velva-Gro.

American Cyanamid Co. plans to shift the headquarters staff of its Petrochemicals Dept. to offices at its Bound Brook, N.J., plant. Moving date: about mid-'61.

Chemstrand Corp. directors have declared a $5-million dividend to be divided between the company's two parent concerns, American Viscose and Monsanto Chemical. And Chemstrand will prepay $5 million of its 4% subordinated notes, held by Avisco and Monsanto, due in '77. This will leave a $19-million balance.

expansion

Carbon Black: Columbian Carbon Co. (New York) has begun construction of its Houston Ship Channel-area plant at a 10-acre site near the Texas & New Orleans railroad line. The plant will produce dispersions of carbon black in polyethylene, polypropylene and other resins.

***p*-Xylene:** Enjay Chemical Co., division of Humble Oil, is set for an expansion of Humble's Baytown, Tex., *p*-xylene plant. Capacity will be upped from 65 million to 105 millon lbs./year by the end of first-quarter '62.

Alcohol: Amoco Chemicals (Chicago) is collecting bids on a number of oxo-alcohol plant sizes. Expansion plans have been hanging fire while the company—a branch of Standard Oil of Indiana—gets a firmer idea of what capital requirements would be necessary. Problem: confused market outlook for polyvinyl chloride resins, major outlet for oxo alcohols.

Butyl Lithium: Foote Mineral Co. (Philadelphia) is starting construction of its butyl lithium plant at New Johnsonville, Tenn. Design calls for 100,000 lbs./year of *n*-butyl and capability in lithium alkyls other than butyl lithium.

Chemicals: Hooker Chemical Corp. (Niagara Falls, N.Y.) has begun construction of its $1.5-million semi-commercial-scale processing plant under the company's Eastern Chemical Division *(CW, May 21, p. 26)*. Hooker plans maximum flexibility of equipment to turn out a succession of products at the intermediate stage between pilot plant and full production.

foreign

Styrene/England: British Hydrocarbon Chemicals (London), jointly owned by British Petroleum and Distillers Co., will build an $8.4-million styrene monomer plant in South Wales. Capacity: 50,000 tons/year.

Nylon/Czechoslovakia: Strojoimport-Polytechna (Prague, Czechoslovakia) has signed a $2.8-million deal with High Polymer and Petrochemical Engineering Ltd. (London) to get a nylon tire-cord plant. Equipment to produce nylon 6 will come from part-owner of the English company, Zimmer Verfahrenstechnik (Frankfurt, Germany), which has a license for the process from Dow.

Electroplate/Netherlands: L. van der Hoorn Chemische-Technische Industrie N.V. (Utrecht, Holland) has completed negotiations to sell majority interest to Harshaw Chemical Co. (Cleveland). The company, renamed Harshaw van der Hoorn, will have van der Hoorn personnel as full-time salesmen of electroplating products, instead of using commission agents.

Chemicals/India: The Indian government is considering a $10-million long-term credit offer made by Montecatini to put up new industrial units. Said to be a blanket credit offer, the agreement would allow India to put it into effect in whatever sector the money is most needed, presumably fertilizer manufacturing.

Chemicals/England: Distillers Co., Ltd. (London), is setting up overseas division for its chemical group. Through the new division, Distillers will expand its now-limited foreign chemical operations.

Plasma spraying applies coatings of a broad variety of extremely high-melting-point materials.

Plasma Arc: Hot News in Coating

Plasma spray coatings, only a few years ago confined to research and development studies, are fast stepping into full-time jobs to meet the high temperatures and wear demands posed by space technology. Currently, some 250 plasma jet-spray units capable of applying these coatings are in use in the U.S., and manufacturers look for a doubling of this business soon.

Plasma spray coating is a process (*see diagram, p. 46*) in which extremely high-melting-point materials (metals, oxides, carbides, nitrides, etc.) are subjected to temperatures up to 30,000 F, melted and then propelled at high velocity (up to 34,000 ft./second) to base materials such as graphite, brass, steel, and certain reinforced plastics.

The bond between the coating and base material is achieved by mechanical interlocking, metallurgical alloying or chemical transformation. The type of material and plasma jet used determine what kind of bonding takes place.

Despite the high temperatures of the plasma, heat is dissipated quickly once the plasma stream leaves the gun; and it's also possible to coat base materials such as paper or wood.

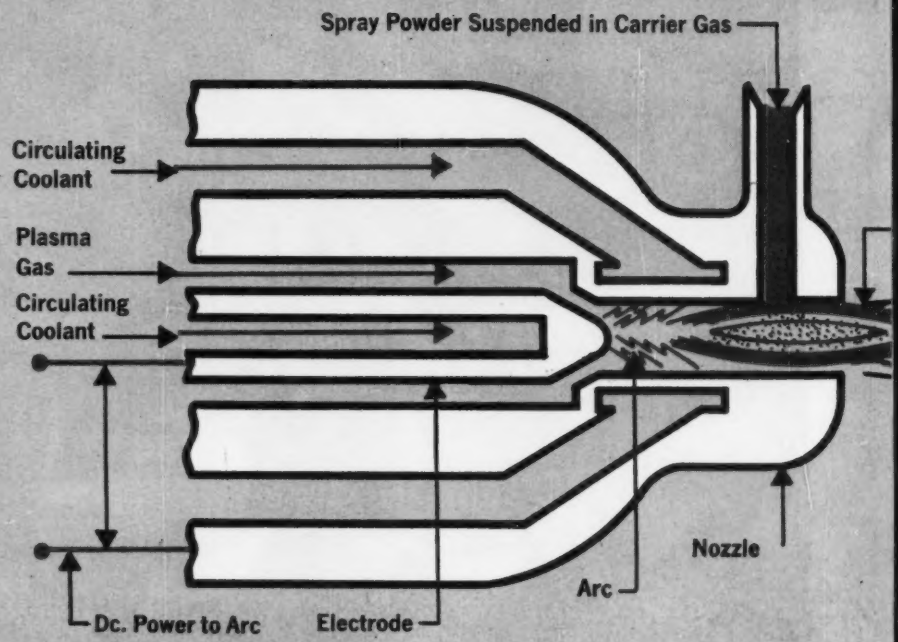
Life Extender: One company that has made use of plasma-applied metal coatings to improve heat resistance and strength characteristics of standard materials is Rocketdyne Division of North American Aviation's McGregor, Tex., operation. The company is engaged primarily in research and test work on solid-propellant rocket motors. One of its problems: fabricating relatively inexpensive motor components that can be used for more than one test firing.

Rocket motor nozzles used in test firings, for instance, are made of a mild 1020 ASI steel, originally cost $75-85. Graphite inserts provide internal protection against temperatures above 5500 F, but the unprotected steel surface of the outer nozzle cone erodes. Welding this back into shape was tried, but cost was $110—more than the price of a new nozzle. By plasma spraying the nozzles with a 0.00125-in. coat of alumina powder, the company has been able to reuse them. It figures it can apply the alumina on a production basis (including labor) for about $10.20 (the alumina costs about 15-20¢).

Although they do not downplay the

How plasma spraying works . . .

An inert gas (such as helium or argon) is passed through a high-energy arc and is "excited" to form a plasma made up of a mixture of free electrons, positively charged ions and some neutral atoms that collide and produce ultrahigh temperature. The powder to be sprayed is fed into this plasma stream just before it leaves the gun and is instantly melted, then projected at high speed onto the prepared base material. The inert plasma stream surrounds the particles and substrate, blocks oxidation.



advantages of the plasma applied coatings, company engineers point out some of the problems they have encountered with the technique. One of the biggest involves the handling of the powders and the parts to be coated. Humidity control must be absolutely maintained or the metal powders will oxidize, making them unusable. Also, the part to be sprayed must be kept clean; even a fingerprint inside a nozzle, for instance, keeps the powder from bonding.

Usual practice at McGregor is to put the powders (which come from suppliers in vinyl plastic bags sealed in cans) into an oven heated at 180-250 F and to keep them there at least 24 hours before use. The part to be sprayed, meanwhile, is sandblasted clean not more than two hours prior to spraying.

Plasma coatings have also been used in a variety of other industrial applications: coating graphite brazing fixtures with molybdenum disilicide, wire-draw dies with chromium carbide, gauges with cobalt carbide. Tungsten carbide has been used on synthetic fiber and paper fabricating rolls for increased wear resistance; ceric and rare-earth oxides serve as combustion catalysts and thermal barrier; epoxy resins may be sprayed on electronic gear with less heat absorption than by conventional potting operations; and metals can be bonded to glass or ceramics.

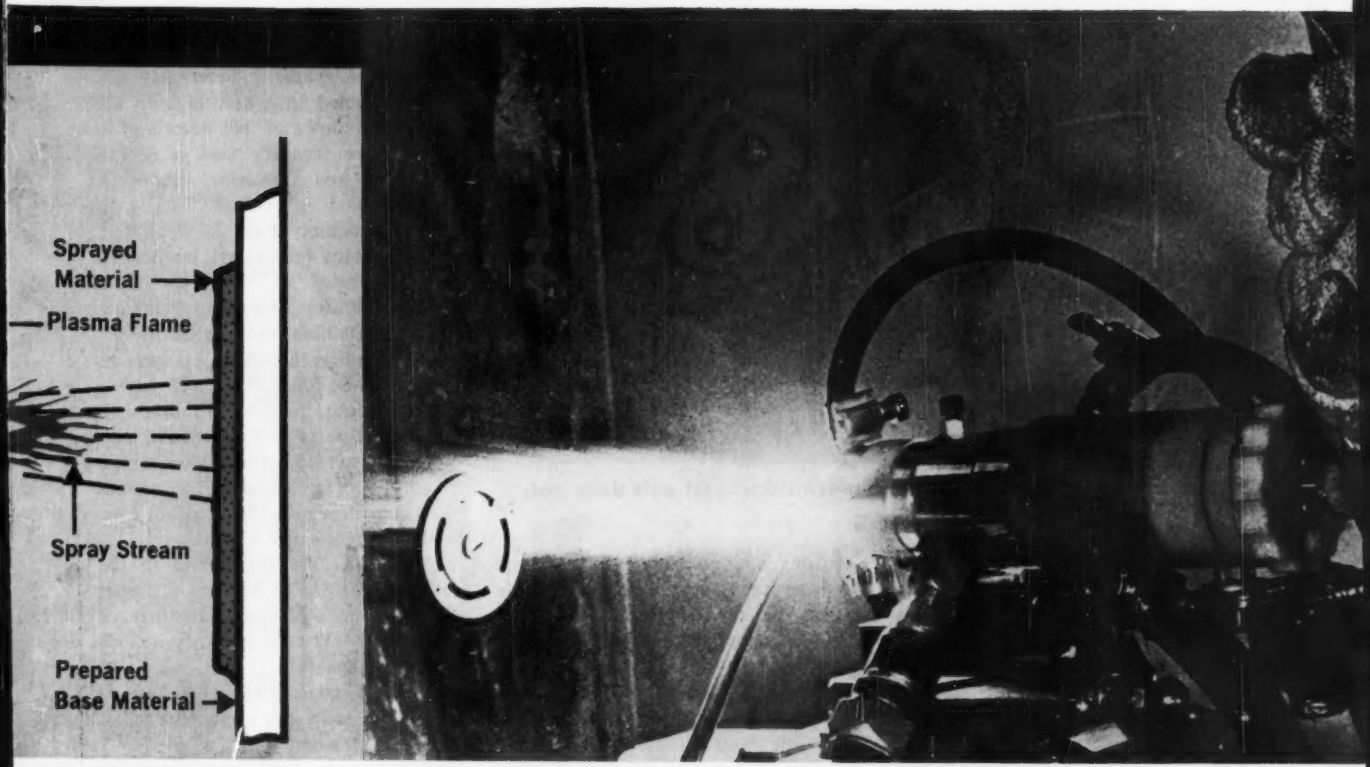
Materials Roster: A list of materials suitable for plasma spraying would include all metals, cermets, most oxides, and the majority of the carbides, borides and nitrides. About 30 spraying materials are being marketed so far.

Prices of standard materials range from about $4 to well over $100/lb., with special materials carrying price tags in the $600/lb. range. Some representative materials costs: $15-18/lb. for pure tungsten; up to $32 for tungsten carbide; $40 for nickel; $120-137 for tantalum. Average cost of powder: $15-20/lb.

Although equipment makers Plasmadyne Corp. (Santa Ana, Calif.) and Metco Corp. (Westbury, N.Y.) are furnishing powders to be used with their machines (and Avco Corp., of Wilmington, Mass., is said to be working a line), the plasma flame powders are also available from other sources. Norton Co.'s Electro-Chemical Division (Chippawa, Ont., Can.) in September came out with a wide range of powders for this use, including seven different borides, six carbides, one nitride, and eight different oxides. The company says that the particle size range of minus 150 mesh to plus 325 mesh generally seems most suitable for the nonmetallic high-temperature range, but it also offers the powders in four other ranges.

Carborundum Co. (Niagara Falls, N.Y.), though it has furnished some boride, nitride and carbide types of materials for plasma spray coatings, so far hasn't been a big factor in the business. But the company has a new super-refractory material, zirconium diboride-molybdenum disilicide (that can withstand 2000 C in oxidizing atmospheres), and it may eventually find use in plasma spray coatings. Right now Carborundum hasn't enough of the material available to fill its own needs.

Wah Chang Corp. (New York) has been selling powders suitable for plasma coatings for about two years. These include the oxides and carbides of tungsten, molybdenum, zirconium,



hafnium, tantalum and columbium.

Another powder supplier is Titanium Alloy Manufacturing Division of National Lead (New York), which is supplying calcium, magnesium, strontium and barium titanates as well as stabilized zirconia, titanium carbide and 99% alumina suitable for plasma spraying.

Kawecki Chemical Co. (New York) is furnishing tantalum and columbium metals and compounds.

A substantial number of companies claim they are able to supply powders for plasma spray coatings. But there's doubt about the suitability of some of these materials. Many of the powders were developed for other uses (such as sintering), don't perform well in plasma spray applications. Not only are size, shape and free-flowing qualities important, but also purity and stability are critical.

Four basic gases are used in plasma spraying: argon, helium, hydrogen and nitrogen. These give a range in temperature from a low of 6000 F to 10,000 F (using hydrogen) to a high of 30,000 F (using argon). But temperature isn't the only consideration in picking the right arc gas. When highly reactive coating materials are sprayed, an active gas (such as hydrogen) would combine and contaminate the sprayed material. Even nitrogen, normally inert, becomes chemically active at high temperature; for highly reactive coating materials, argon must be used.

Pioneers: Most of the developmental work on plasma jet units has been done in the U.S. by Plasmadyne Corp. (set up by G. M. Giannini in '56) and by General Electric at its Knolls Research Laboratories.

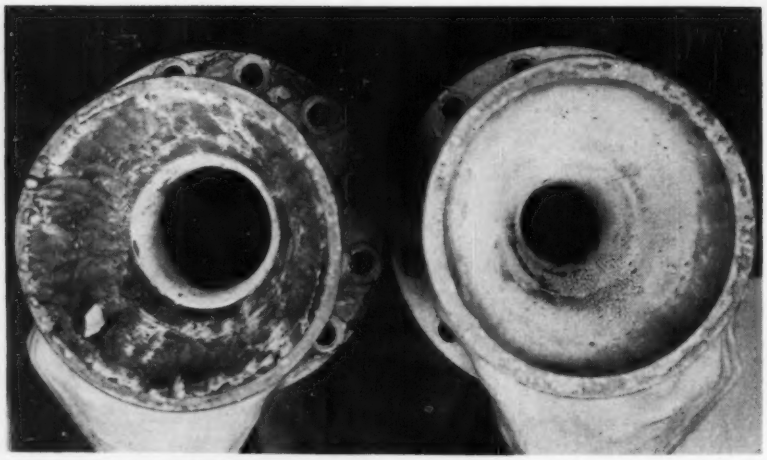
Considerable work was done on plasma generating devices in Germany, however, in the '20s. A work-in-progress report given by Wolfgang Finkelnburg at a symposium at Berkeley, Calif., in '56, in which he outlined European developments, helped stimulate interest in the process in the U.S.

Although purists might argue otherwise, plasma spray coating can be considered a form of flame spraying —i.e., if flame spraying is considered as a process in which a material is brought to its melting point and sprayed onto a surface to produce a coating.

The other main types of flame spraying make use of (1) pure or alloyed metals in rod or wire form and (2) high-temperature refractory ceramics (such as alumina and zirconia) and hard-to-work materials (such as tungsten carbide) in powdered form. Both make use of an oxygen-acetylene flame, which limits their use to materials that can be melted at temperatures up to 7500 F.

The plasma jet system, operating as it does in the 15,000-30,000 F range, has extended the use of flame spraying to almost unlimited use. Although plasma-applied coatings are superior to conventional flame-sprayed coatings in some respects (reduced porosity, improved bond and tensile strengths, less oxide content with metals), the process is looked upon more as a supplement to, rather than as a replacement for, the older flame spray systems.

Hardware: Speaking very generally, a plasma spray unit, ready to plug into a user's line, consists of a power supply converter, control console, spray gun and material feed mechanism (all the user needs additionally is a supply of bottled arc gases and



Uncoated nozzles erode at 5500 F; plasma-sprayed unit does not.

granular coating materials). The standard unit costs about $10,000 but it's not unusual for a machine with special modification to cost almost twice that.

To run the unit, the operator (which the machine makers claim can be trained in a day) turns on the coolant (water) and power (220-440 v.dc.), sets the gas flow, presses the starter and sprays. It sounds simple, but because of the newness of the technique and since the machines have uses other than for spraying, the main operators are usually highly trained men, such as welders.

'Big Three': Three U.S. companies now furnish units for plasma spraying: Avco, Metco and Plasmadyne. Avco calls its spraying unit the PG-030-2 Plasmagun; Metco's is tradenamed MB Type Plasma Flame Spray Gun, and Plasmadyne's unit is the Plasmatron SG-1 Spray Gun. Thermal Dynamics Corp. (Lebanon, N.H.) makes plasma jet units but not for spray purposes; it has given to Metco the rights to its machines for spray application.

Among other companies working with plasma jet spraying equipment are Air Reduction Co. (New York) and Amperex Electronic Corp. (Hicksville, N.Y.).

Although a number of companies already have patents and patents pending, there has been little legal squabbling over plasma jet processes. There does appear to be some rumblings in the background that may erupt into legal storms in the not-too-distant future. One company appearing to have a strong legal position both in process and apparatus is Union Carbide's Linde Co. division, which has about 10 U.S. patents in the field of plasma jet spraying.

A number of companies have put together plasma jet units for their own use in research and development work. Westinghouse, General Electric and General Motors are all thought to be working with these machines.

Machines are also doing custom coating work. Linde, for instance, has a process called Plasmarc Plating, which it uses in both the fabricating and coating of parts. This is done at the company's Speedway, Ind., plant, is an outgrowth of its work in flame-spraying thin coatings of tungsten carbide and aluminum oxide in a detonation coating process it calls Flame-Plating.

Another company offering custom coating and using a unit of its own design is the newly created Plasma System Division of Schori Process Corp. (Port Washington, N.Y.). It has been in the field of metal spraying about 20 years, set up the new division about three months ago.

Although still in its infancy, plasma spray coating has evinced tremendous interest on the part of metal fabricators and their customers. With the development of simpler plasma jet units (these are in the works) and with further research on the use of plastics and other more conventional coating materials with the technique, the field of plasma coating should be a hot item of interest for some time to come.

Syndet Sales Mark

Sales of synthetic detergents and soaps bubbled to a new high in the first nine months of '60, according to latest figures from the Assn. of American Soap and Glycerine Producers. Sales totaled 3.3 billion lbs. worth $855.7 million, both 3.1% higher than previous records set in the first nine months of '59.

The industry sold $613.2 million worth (2.5 billion lbs.) of synthetic detergents during the period, an increase of 4.6%. Solid synthetics (2 billion lbs.) accounted for $446.6 million, up 3%, while sales of liquids (485 million lbs.) were $166.6 million, a rise of 9.4% over last year. Synthetics now constitute about 75% of all soap and detergent sales.

Soap sales remained close to the '59 level, at $242.5 million, a dip of 0.7%. Some $159.6 million worth of toilet soap (439 million lbs.) is included in that figure.

Sales of scouring cleansers, not included in soap and detergent sales, were down slightly this year—$39.3 million (289 million lbs.)—compared with '59's $40.8 million.

Drycleaning Washer

The fast-growing coin-operated drycleaning business may get a significant boost soon. A Colorado company has developed a way to convert standard automatic clothes washers into drycleaning units.

Camerland Colorado, Inc. (1001 West Center St., Denver), has patented a filtration system that makes the conversion relatively simple, and is now offering licenses to prospective operators of coin-operated drycleaning shops.

Camerland claims its system can be adapted to almost any brand of washer, with a few modifications. First, motor capacity must be boosted from the usual ½ hp. to ¾ hp. because the solvent is heavier than water. Also, most rubber parts on the machine must be replaced with plastic and metal to resist solvent attack. And cycle time must be changed to a fixed 20 minutes. The system uses standard, no-flash-point solvents.

Camerland feels it has eliminated one of the big problems of owners of coin-operated drycleaning shops: filtering the solvent. Its system uses diato-

INTERMEDIATES

Acetaldehyde Ammonia
Acetophenone
Acetyl Chloride
Adipoyl Chloride
Anisic Aldehyde
Anisyl Acetone
Anisyl Alcohol Tech.
Anisyl Cyanide
Azelaoyl Chloride
Benzalacetophenone
Benzhydrol
Benzhydrylamine
Benzhydryl Chloride
Benzophenone Tech.
Benzyl Alcohol Tech.
Benzyl Cyanide
Butyrophenone
Butyroyl Chloride
n-Caproic Acid
Caproyl Chloride
Capryloyl Chloride
p-Chlorbenzhydrol
p-Chlorbenzhydryl Chloride
p-Chlorbenzophenone
p-Chlorbenzyl Cyanide
Cinnamoyl Chloride
Dibenzyl Ether
Dicyclohexyl Carbinol
Dicyclohexyl Ketone
p,p'-Dimethoxybenzophenone
Diphenyl Acetone (unsym)
Diphenyl Methane
Ethyl Formate Tech.
Ethyl Phenylacetate
beta Ionone
Isobutyrophenone
Isobutyroyl Chloride
Isovaleric Acid
Isovaleroyl Chloride
Lauroyl Chloride
p-Methoxy Phenylacetic Acid
Methyl Heptenone
Methyl Phenylacetate
Myristoyl Chloride
Oleoyl Chloride
Palmitoyl Chloride
Pelargonyl Chloride
Phenylacetic Acid
Phenylacetone
Phenylacetyl Chloride
Phenyl Propyl Alcohol
Phenyl Propyl Chloride
Potassium Phenylacetate
Propionyl Chloride
Propiophenone
Sebacoyl Chloride
Sodium Phenylacetate
Stearoyl Chloride
And
Other Intermediates

Send *for new booklet which describes our operation*

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East Rutherford, New Jersey

Keep chemicals contamination-free

GER-PAK
POLYETHYLENE
LINERS IN ROLLS

SAVE WORK! Just slip GER-PAK Liners onto any holder above work area. No handling problem!
SAVE TIME! Pull Liner down over mandril. Then zip off quickly, cleanly at perforation!
SAVE FUSS! No smoothing-out by hand! Insert mandril and Liner into container, "cuff" around top, remove mandril!

For drums
For cartons
For cans, pails

- Seals out moisture and all foreign matter!
- Chemically inert to protect containers!
- Up to 120 inches in width; no limit to length!
- Available gusseted and non-gusseted!
- Tie-off or peel-over construction!
- LEAKPROOF DOUBLE SEAL optional upon request!

Write Dept. CL2 for samples
the short way to say superior polyethylene sheeting

GER-PAK®

GERING PLASTICS, division of STUDEBAKER-PACKARD CORP., Kenilworth, N.J.

maceous earth and activated charcoal to clean the solvent between loads. The solvent remains clean for 200 cycles without the use of additives. Both the cycles and the filtering of solvents are electronically controlled.

In addition to the coin-operated commercial units, Camerland is preparing to license household units under the company name of Cleanerama Sales, Inc. Machines will be leased for a basic charge, plus monthly rental (similar to the system used by water-softening companies). One appliance could serve as clothes washer and drycleaner.

New Paint Purchaser

Companies selling paint to the U.S. armed forces hereafter will deal with a new agency. The Military Industrial Supply Agency (MISA), set up last November as military single manager for such items as hardware, nuts, bolts, paint, rope and other industrial products, has become operational.

About 600,000 items were originally listed under the order setting up the agency. Eventually the number will be trimmed to 200,000. Some 3,500 paint items, thinners, paints, brushes, etc., are on the list, represent a dollar volume of around $26 million/year.

Function of the single-manager agency: it does all the buying of certain items for all the armed forces, manages the inventories, computes requirements, and handles related aspects of supply management.

Up to now, paint for the military had been bought on a single-department procurement assignment, with the Navy doing all buying—but not being involved in the related functions. The new agency—which is under the Navy's General Stores Supply Office in Philadelphia—is responsible for the supply management aspects as well.

But there are some exceptions. The General Services Administration (GSA) will continue to buy paint, and most major military field installations will continue to buy small lots locally.

The Navy is the largest military user of paints—it buys $16.5 million worth yearly—while the Army uses $5.2 million worth, the Air Force $3.4 million worth, and the Marines $500,000 worth. Biggest single use-item: Navy ships. About 85 paint makers have supplied the Navy.

PRODUCTS

Adhesive for Nylon: Anglo Chemical & Rubber Corp. (36 Walker St., New York) has a new adhesive, designated M-2, which permanently bonds nylon to nylon. It's formulated to withstand industrial washing and drycleaning, is available in 5- and 55-gal. containers.

•

Textile Dye: A lemon-yellow acid textile dye, National Fast Wool Yellow GL, is being offered by Allied Chemical's National Aniline Division (New York). Said to be a good base for bright-yellow colors, it is level-dyeing and offers good light- and wet-fastness. It is especially designed for wool and nylon, wool and silk, and cross-dyed wool-Dacron blends.

•

Aerosol Adhesive: A liquid, pressure-sensitive, aerosol-packaged adhesive will soon be marketed nationally by Avery Label Co. (117 Liberty St., New York). The product, called Spray Grip, is intended for a wide variety of jobs involving paper and paper products. Spray Grip dries in about 30 seconds. One 12-oz. can of the product is said to be equivalent to 32 oz. of rubber cement and thinner.

•

Pale Shellac: Acme Shellac Products Co. (108 Blanchard St., Newark 5, N.J.) is selling a new product called Pale-Pale Refined Bonedry Shellac. Of extremely pale color in alcohol or aqueous solutions, it lends itself to the production of light-colored copolymers with styrene, has good leveling and wearing qualities. The product is available in commercial quantities.

EXPANSION

German Wax Plant: Farbwerke Hoechst AG. (Frankfurt, West Germany) will invest $1 million in its Gersthofen plant near Munich to enlarge production capacity for Hoechst waxes.

•

Canadian Plant: Wyandotte Chemicals Corp.'s J. B. Ford Division (Wyandotte, Mich.) has broken ground for a Canadian plant in Scarborough Township, Ontario. The 52,000-sq.ft. facility will manufacture the Ford line of cleaning and sanitizing and metal cleaning products.

UNITED STATES BORAX & CHEMICAL CORPORATION

Adopts This New Abbreviated Form of Identification...

U.S.BORAX

We have not changed our name; we have merely shortened it for your convenience. You have helped us arrive at this decision by your repeated usage of this abbreviated form in lieu of our full corporate name. Now the shortened version becomes official for all purposes other than legal matters. It's U. S. BORAX . . . your most dependable source of supply for borates, boron chemicals and potash.

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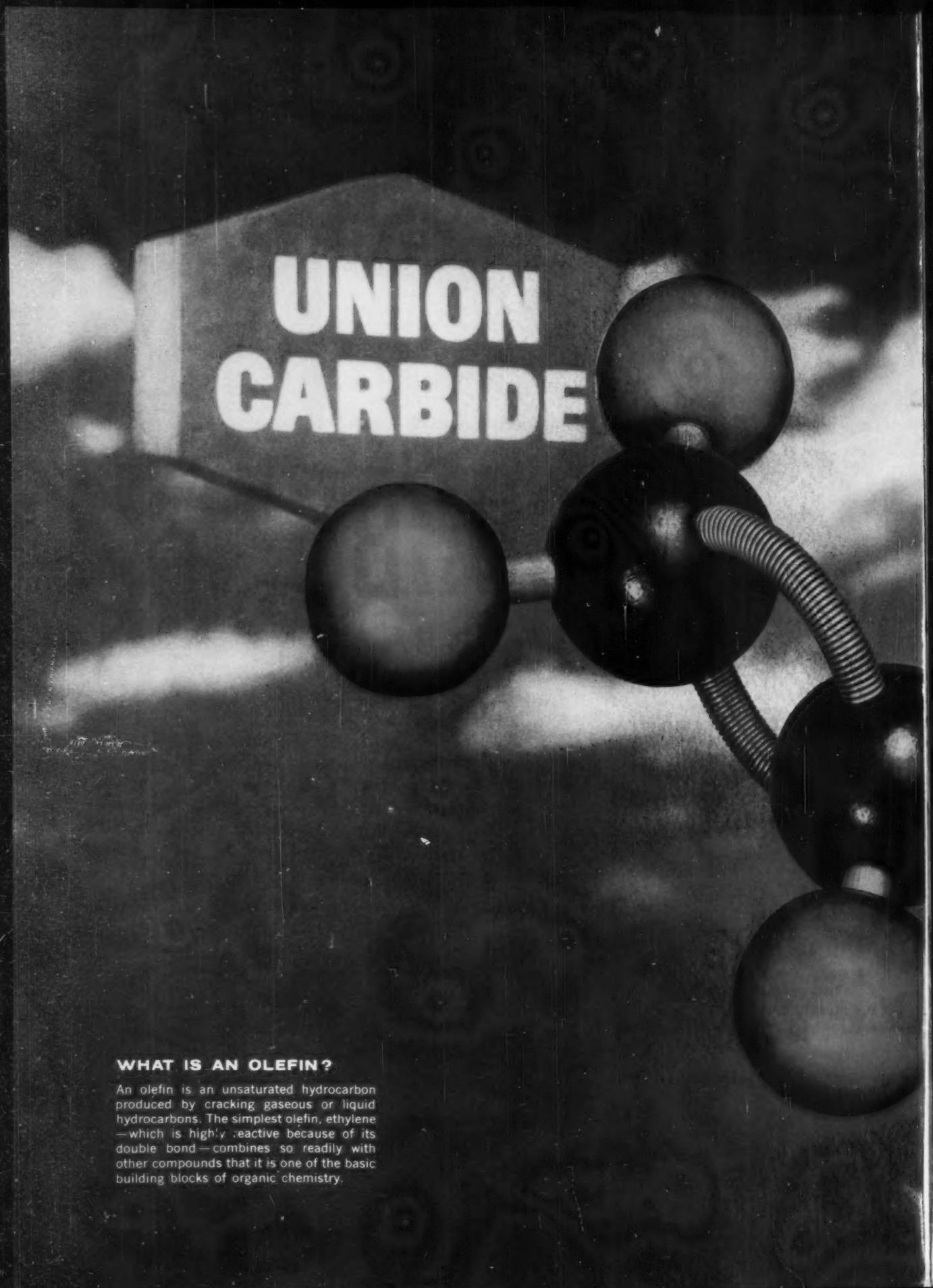
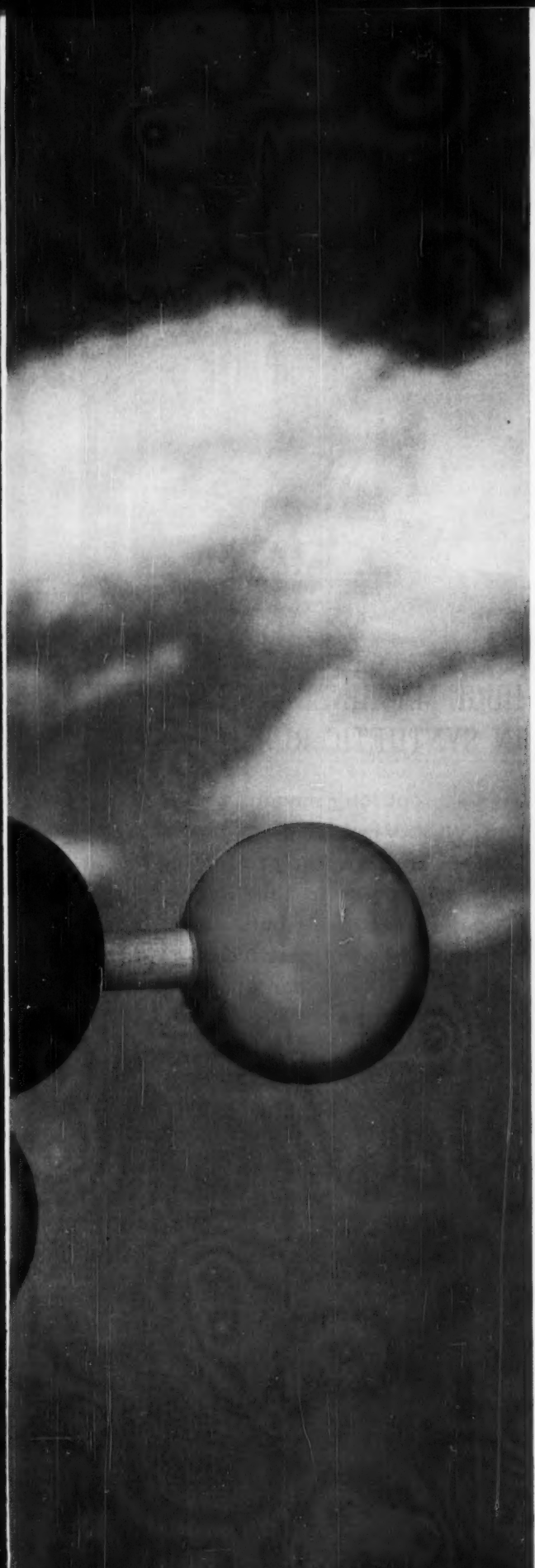


WHAT IS AN OLEFIN?

An olefin is an unsaturated hydrocarbon produced by cracking gaseous or liquid hydrocarbons. The simplest olefin, ethylene —which is highly reactive because of its double bond—combines so readily with other compounds that it is one of the basic building blocks of organic chemistry.



WHY OLEFINS IN OUR NAME IS IMPORTANT TO YOU...

The "Olefins" part of our name is an indication of the importance we place on our energetic and continuing program for seeking new ways to use olefins and other highly-reactive hydrocarbons, such as acetylene.

As a separate Division of Union Carbide Corporation, we can assure you of prompt attention in handling inquiries about olefins and related products.

You benefit, because the Olefins Company's unique resources and experience with these products are available through a single staff.

Whether you are presently using olefins, or planning to use them in the future, we welcome the opportunity to answer any questions you may have.

Olefins Company resources are also applied to the development of several important non-olefins. For instance, we can make acetylene available by pipeline within an area near any one of 10 plant sites.

We also market other non-olefinic products—such as calcium carbide, quicklime, and lime hydrate. For full information, write Union Carbide Olefins Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y.

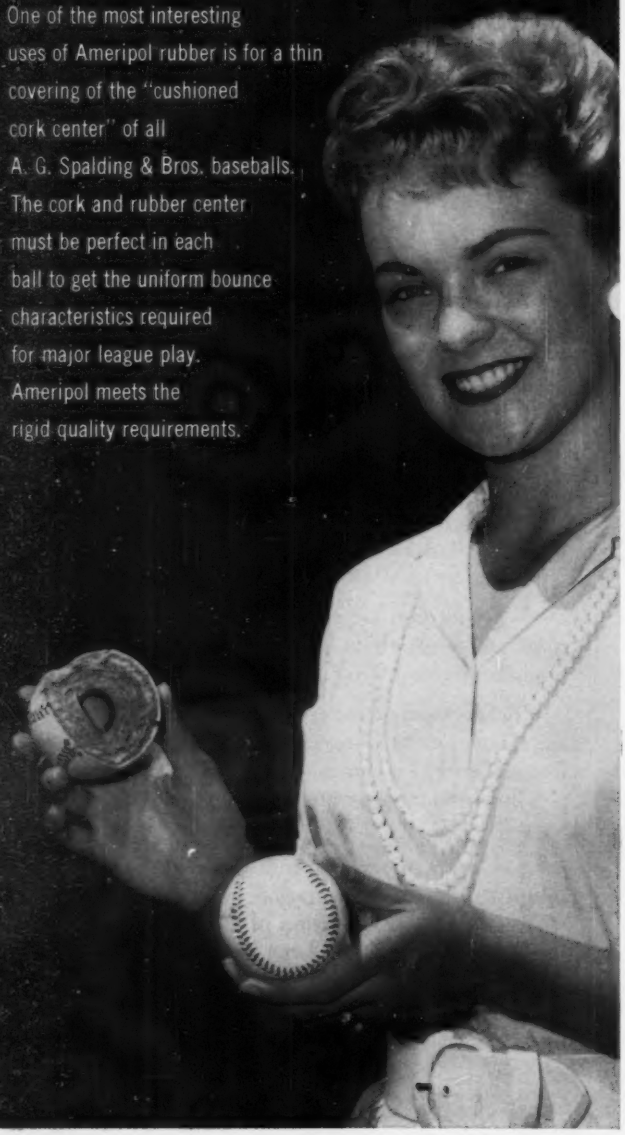
UNION CARBIDE OLEFINS COMPANY

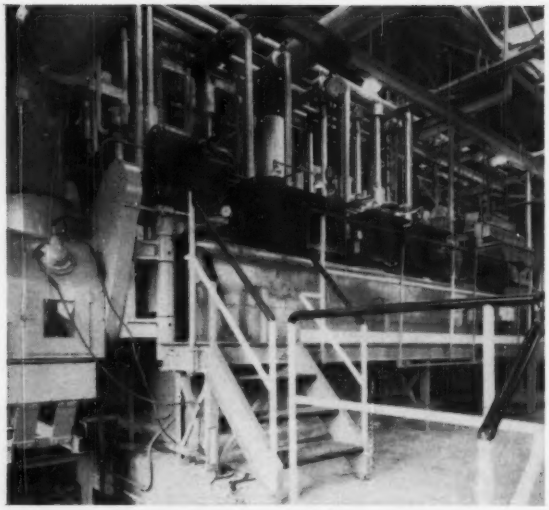
UNION CARBIDE

NEWS FROM GOODRICH-GULF

AMERIPOL FOR THE LONG BALL

One of the most interesting uses of Ameripol rubber is for a thin covering of the "cushioned cork center" of all A. G. Spalding & Bros. baseballs. The cork and rubber center must be perfect in each ball to get the uniform bounce characteristics required for major league play. Ameripol meets the rigid quality requirements.





HUGE MACHINE SETS FAST PACE IN SYNTHETIC RUBBER DRYING

This 40-foot long machine, at the Institute, West Virginia plant of Goodrich-Gulf, is the largest production-scale extrusion dryer in the industry. The machine drastically cuts drying time, also delivers a polymer free of moisture and with low ash content to improve product quality.

The extrusion dryer has a design capacity of 6000 to 8000 pounds per hour. Entire cycle time, from the time wet rubber enters the feed box until it passes through a pelletizing die, is 5 to 10 minutes. Development of this machine represents a major forward step in production of synthetic rubber.

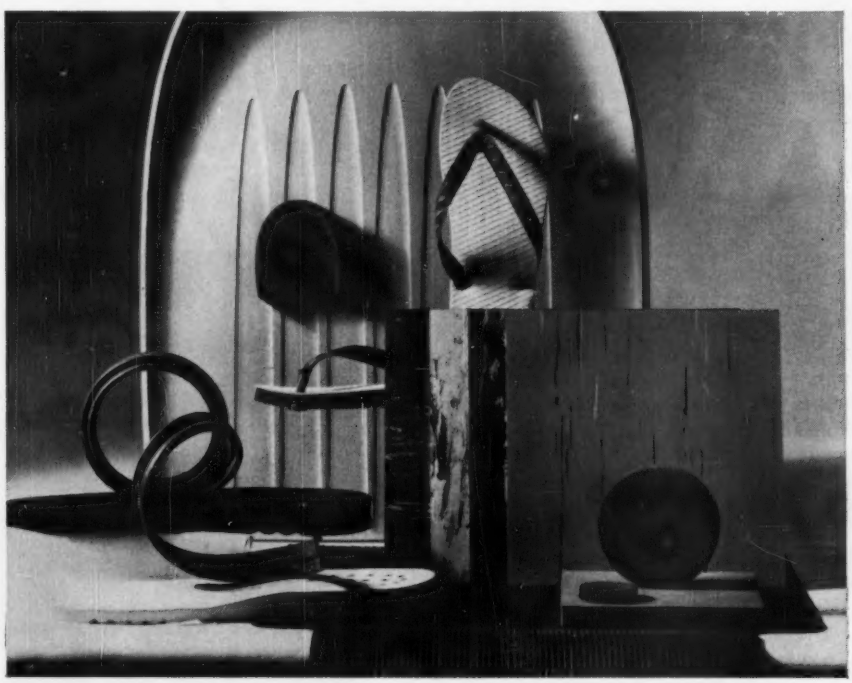
NEW AMERIPOL POLYMER EASIER TO PROCESS ...IMPROVES PRODUCT QUALITY

Ameripol 4601 is a new polymer designed with medium-low viscosity to enable the fabricator to reduce processing time and power costs, and to eliminate the need for costly peptizing agents. Physical properties compare favorably with those of a peptized high-viscosity polymer such as SBR 1502.

This polymer permits easier mixing, smoother calendering, faster extrusion. The polymer exhibits less shrinkage and improved smoothness and quality. The elimination of peptizing agents not only reduces cost, but avoids a possible source of discoloring.

For many types of rubber products including sponge, floor tile, soling and heels, mats, and extrusions, you can switch to Ameripol 4601 and obtain equal or improved physical properties, while reducing processing costs.

This new polymer is another result of Goodrich-Gulf's continuing product development program which can help you in fabrication or use of synthetic rubber polymers. Polymer evaluations and test data are available through Goodrich-Gulf Technical Service. Address: 1717 East Ninth Street, Cleveland 14, Ohio.



AMERIPOL 4601 has ideal qualities for many products

- Light Color
- Low Viscosity
- Good Physical Properties
- Low Water Absorption

Ameripol
THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.
THE ONE TO WATCH FOR NEW DEVELOPMENTS

CW PHOTO—ED WALLOWITCH

SAACI Speakers: Amsco's J. E. Newman, Mobil's S. D. Moody.

Gearing for Stiffer Selling

Last week's meeting of the Salesmen's Assn. of the American Chemical Industry (SAACI) pointed up chemical sales management's most pressing current problem: how to cope with mounting competition.

The 300-odd sales personnel attending SAACI's ninth annual chemical sales clinic devoted most of their attention to exploring competition's impact on the line salesman.

Depth Selling: Highlight of the clinic was the discussion of the methods of depth selling, also known as multilevel selling. According to American Mineral Spirits Co.'s J. E. Newman, Eastern sales development manager, and Mobil Oil Co.'s S. D. Moody, depth selling of chemicals through contact with key customer personnel at several different levels is vital to effective salesmanship. What's more, they feel that the importance of "depth penetration of accounts" is growing as chemical selling becomes more competitive.

Why Depth Selling? Newman gave the SAACI members several situations in which depth selling can be beneficial to sellers—and to buyers. The most obvious: in dealing with new products or development materials.

Newman also noted that depth selling can help when promoting new uses for established materials. And he pointed out that the depth approach is often the only way to reach those purchasing influences that lie beyond the purchasing department—i.e., engineering, research and production.

How can a sales staffer determine when depth selling will help him? Moody provided SAACI members with some clues. He proposed a four-part guide for analyzing the customer's organization:

(1) Determine purchasing policy.
(2) Pinpoint purchasing authority.
(3) Locate the centers of interest.
(4) Determine whether there are any conflicts of interest within the customer firm.

Moody elaborated on the last two ideas by pointing out that in some instances various purchasing influences may be pulling in different directions. In these cases, says Moody, the salesman must seek out the key influences and "neutralize" them to win the sale.

Newman suggested two other prerequisites to a successful deep-sell effort: flexible, rapid communications; and careful coordination of all persons involved. This may involve the naming of an account coordinator, sometimes tabbed the "relationship coordinator."

Summing Up: The impact of increasingly competitive markets on the line salesman was summed up aptly by Heyden Newport's field sales manager, Theodore Risch. "Tomorrow's chemical salesman must take his cue from successful chemical processes," said Risch. "That means he must use the raw materials that are available, learn to recycle his ideas so that he can turn out a high yield."

Caverns for Chemicals

Sun Oil Co. opened one of its three Marcus Hook, Pa., underground propane storage mines to public inspection last week, marking completion of the world's largest storage cavern hewn out of solid granite.

Fenix & Scisson, contractor for Sun's project, believes caverns could also be used for storing anhydrous ammonia, volatile chemicals or jet and missile fuels — even atomic reactor wastes. Sun says it is considering underground propylene storage, though no plans are on paper.

Advantages of this method over surface tanks, say Sun engineers: lower initial costs (85% savings for propane, 60% for butane), lower maintenance cost, safer storage and above-ground space saving. Sun also has 11 other caverns in Michigan and Ontario for LPG storage. These were mined in salt formations. The Marcus Hook cavern is the first to be constructed in granite, Sun says.

The largest cavern of the three holds about 400,000 bbls. of propane in a 2¼-million-cu.ft. space. Surface area used is less than ¼ acre, compared with an estimated 25-30 acres for above-ground storage for over 500 pressure tanks. The cost of this cavern is less than $3-million—or $7/bbl., compared with pressure storage costs of about $45/bbl. for propane, says Sun.

Sun's man-made cavern for LPG storage is hewn out of solid granite.

On the move to serve you better

Everything at PITT-CONSOL is on-the-move to help you keep pace in today's competitive market. Resources, raw materials, people, skills... *the ability to adjust swiftly to fill urgent requirements*... are all smoothly coordinated for *complete* buyer satisfaction.

In addition to high quality chemicals, you can expect and get the ultimate in service-support and personal follow-through. Specify PITT-CONSOL for the extras that give you the edge.

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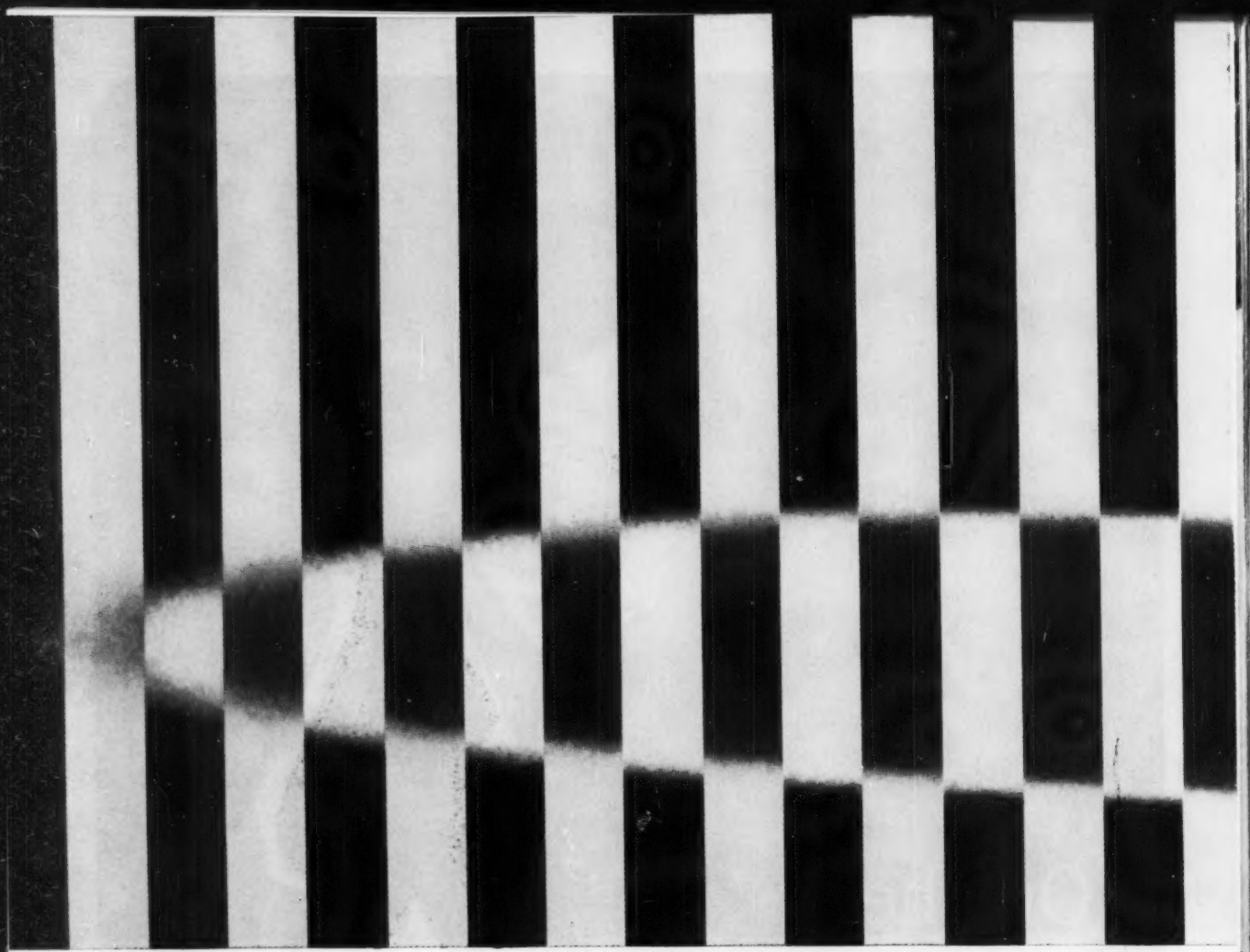
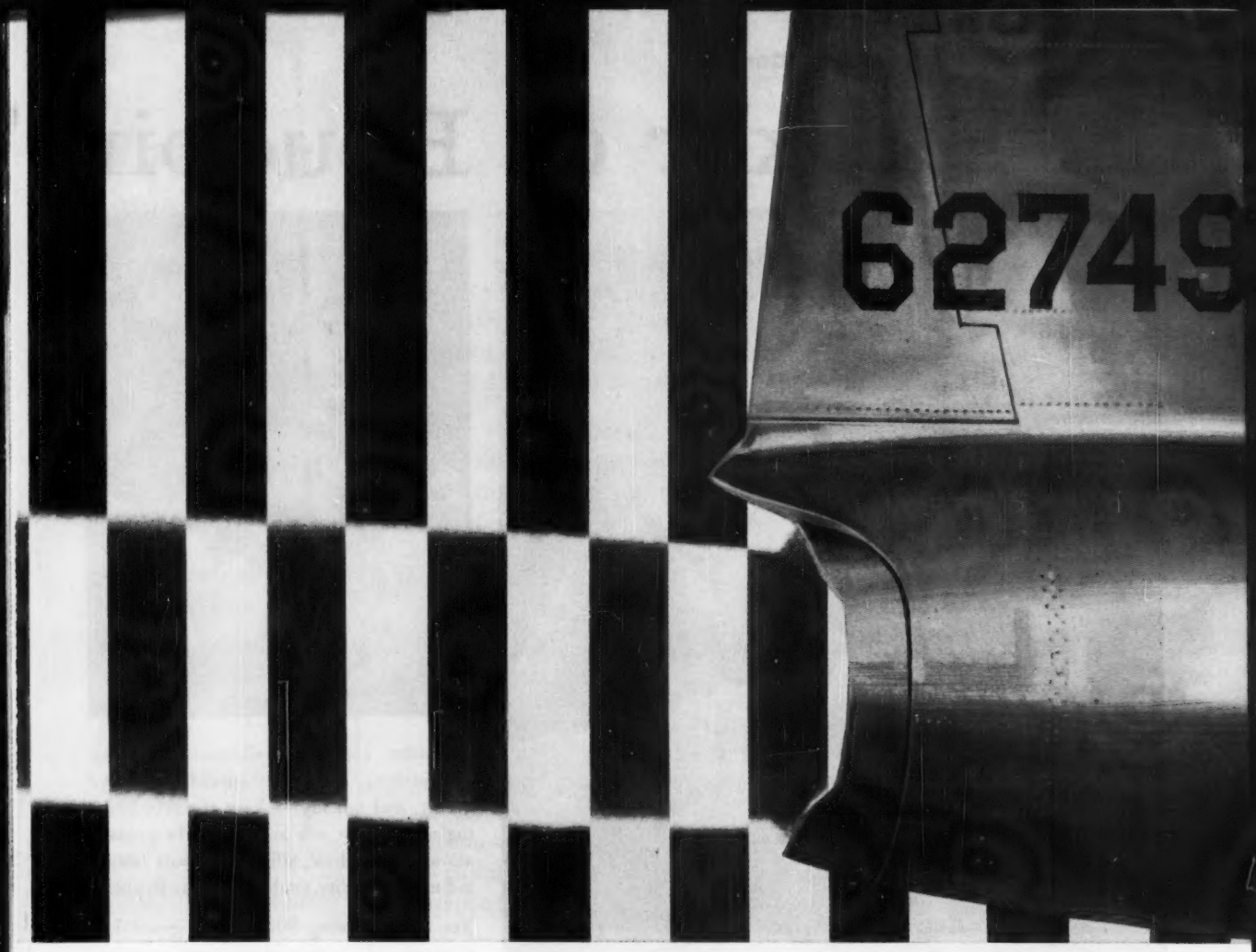
HIGH QUALITY PHENOLS, CRESOLS, CRESYLIC ACIDS • RUBBER CHEMICALS • ARYL MERCAPTANS • ALKYLATED DERIVATIVES



How to cook jet fuel



When a jet clips along at about Mach 2, everything gets hot—not only the exhaust gases and aircraft skin, but the fuel itself. So when Pratt & Whitney Aircraft tests an engine on the ground, every component is checked out under conditions that simulate flight environment. The fuel must be heated to 550 degrees F to duplicate high speed conditions.

But, on the ground among crews of technologists and in the middle of expensive installations, how do you safely heat up a fuel that's as touchy as a bomb?

Pratt & Whitney Aircraft uses a unique Monsanto chemical called Aroclor 1248. It's fire resistant and chemically inert. It can be heated to 600 degrees F without breaking down or boiling. This oily liquid is heated to the desired temperature at a site hundreds of feet away from the fuel. The hot liquid is piped at pressures up to 30 pounds per square inch to a heat exchanger where the heat is transferred safely to the explosive jet fuel. The temperature can be controlled to within 2 degrees; thus providing maximum safety and accuracy for the static test facility.

United States Steel is a major supplier of benzene of uniform quality for the manufacture of Aroclor 1248 and related chlorinated polyphenyls. Inert, chemically stable, fire resistant Aroclor 1248 is another example of the unique products derived from USS Chemicals—basic building blocks for organic chemical manufacturing.

Benzene • Toluene • Xylene • Phenol • Cresol • Cresylic Acid • Naphthalene • Creosote • Pitch • Picoline • Pyridine Ammonium Sulfate • Ammonium Nitrate • Anhydrous Ammonia • Nitric Acid United States Steel Chemical Sales Offices in: Pittsburgh, New York, Chicago, Salt Lake City and Fairfield, Alabama.

Aroclor is a registered trademark of the Monsanto Chemical Company

USS Chemicals

TRADEMARK

SILICONE NEWS from Dow Corning

In Bunker or Boudoir

Cosmetics containing silicones are easy and inviting to use — spread smoothly, evenly, and quickly — keep the skin looking and feeling soft and fresh. In preparations for the hair, silicones impart luster, aid manageability, enable it to *stay* in place.

Yes, Dow Corning Silicones do guard her glamour—do help build and protect profits. Or do you know this from experience?

Silicones guard her glamour... protect your profits, too

Approaching the fourteenth green or dressing for the Club formal, hers is a lasting loveliness. Her complexion stays alive, vibrant . . . shielded against wind, sun, irritants . . . thanks to her smart choice of cosmetics containing Dow Corning Silicones.

Silicones add protective properties . . . highly desirable extras that are synonymous with quality cosmetics. Cosmetics with silicones turn back water, minimize loss of natural skin lubricants, help keep skin from becoming dry and chapped. At the same time, silicones repel water-borne irritants and stains — so important in baby creams and hand lotions. Silicones also keep sun tan preparations from washing away; help hair beauty aids resist the effects of humidity; assure longer protection.

Write your nearest Dow Corning office for detailed information on silicones in cosmetics.
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ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

Washington
Newsletter

CHEMICAL WEEK
November 26, 1960

Eisenhower's decrees to cut federal spending overseas and "buy American" will have little direct effect on domestic chemical process industries. Although it's too early to put an estimate on the order's impact, it will be felt most in sales of U.S. consumer goods to military and civilian post-exchanges and commissaries.

For example, as much as $500 million spent by, and on, U.S. personnel abroad each year may be saved. The bulk of this saving will result from the recall of 284,000 military dependents and reduction of civilian agency staffs by a figure yet to be determined. But much of that $500-million annual drain on the U.S. balance of payments also will be reversed by requiring exchanges and commissaries to buy drugs, cosmetics, other CPI products from the U.S. rather than from foreign producers. This means that while less be spent on U.S. overseas purchases of these types of goods, the sales will go to domestic suppliers.

However, other CPI products will be specifically exempt from the buy-American orders. For example, in military procurement and International Cooperation Administration off-shore procurement programs —where Eisenhower hopes to save an annual total of as much as $500 million—petroleum products, rubber, sugar and other raw materials related to chemical industries will continue to be bought overseas. Reason: cheaper freight rates and to avoid hurting underdeveloped nations that produce such products. The exemption from buy-American rules under ICA alone is estimated at $200 million.

The impact of buy-American exhortations on foreign aid agencies is virtually impossible to assess. Here, too, raw materials would be less affected than finished manufactured goods.

Efforts to expand U.S. exports already were under way before the Eisenhower decrees were announced (*see also p. 109*). President-elect Kennedy has not yet indicated how closely he will adhere to the new policies.

•

A $482,200 contract for construction of a saline water plant at Webster, S. D., to convert brackish water by electrodialysis, has been awarded to Austin Co. of Cleveland and Asahi Chemical Industries Co. of Osaka, Japan.

The contract for the 250,000-gal./day plant calls for completion in 300 days. The city of Webster is supplying the site and delivering the brackish water to the plant from city wells.

Austin will construct the plant under Asahi's supervision, furnishing almost all the materials and labor from domestic sources. Asahi will make the membranes, spacers and gaskets in Japan. The bid was subject to evaluation under the so-called Buy American Act.

Washington Newsletter

(Continued)

Two other bids were received: one from Cleaver-Brooks of Waukesha, Wis., the other from Ionics Inc. of Cambridge, Mass. They ranged from Austin and Asahi's low bid up to $553,267.

Ionics Inc. immediately protested the awarding of the contract, said: "Asahi Chemical has no commercial experience in desalting brackish water as required of the bid specifications. . . . On a 20-year operating basis the Japanese plant will cost the U.S. taxpayer substantially more than an already tested Ionics design."

The company also declared: "We own the patents in the U.S.A. and Japan. By awarding this contract to a Japanese firm the U.S. Government is, in effect, forcing an infringement of our patents. We will have to sue the U.S. Government if the plant is built." This week Ionics Inc. was trying to arrange a meeting with the Office of Saline Water to discuss its case.

•

A proposed ruling on tax-exempt scientific organizations has been issued by the Internal Revenue Service in a second attempt to resolve the dispute between the private and noncommercial labs. The first one was withdrawn some months ago because there were many objections.

This one attempts to define and limit the type of research an organization such as Battelle Memorial Institute can do without losing its tax-exempt status. The organization must be operated "primarily for purposes of carrying on fundamental as contrasted with applied research." But also it must do research in pursuit of scientific knowledge, rather than for a specific purpose for a sponsor, and results (patents, copyrights, etc.) must be made available to the public on "a nondiscriminatory" basis. Final definition of what "nondiscriminatory" means in this sense will probably be worked out in court suits.

The volume of business of the nonprofit institutions has grown from about $100 million six years ago to about $250 million last year. Private labs have long complained that the nonprofit labs have actually been doing applied, commerical research, reaping large profits in patents, and operating under a tax-exempt status.

A spokesman for the American Council of Independent Laboratories views the new ruling as a substantial victory. "I'm sure the nonprofits won't like it," he says. But he acknowledges that the proposed ruling leaves some room for interpretation.

•

Sen. Kefauver's antitrust subcommittee hearings on drug prices may lead to the introduction in Congress of legislation aimed at lowering drug prices. It's uncertain what form this may take. (Kefauver will return to drug hearings, probably in January, after he has the prize-fight industry up for examination.) But possibilities include tighter federal licensing and inspection rules, forced use of generic names in promotion, and changes in patent laws.

THE LITHIUM REACTOR

CURRENT INFORMATION ON LITHIUM CHEMISTRY AND METALLURGY

LITHIUM COMPOUNDS TAKE ON NEW IMPORTANCE AS CATALYSTS

Lithium compounds have recently been branching out into important new commercial applications in the process industries with the utilization of their unique properties as catalysts for the manufacture of a wide range of products. In many cases, the use of lithium or lithium compounds results in reduced costs, faster processing, unique products, and/or the elimination of undesirable side-effects.

Synthetic Rubber: Several companies have recently announced the construction of new plants for the manufacture of polyisoprene synthetic rubber. This type (cis-1,4 polyisoprene) is strikingly similar in structure and properties to natural rubber, and surpasses the natural product in a number of respects. Some of these new plants will use lithium catalysts, such as n-butyllithium, in their processes, since these catalysts favor the formation of the necessary cis-1,4 structure.

Ethylene Polymerization: Lithium aluminum organic compounds have been found useful as catalysts for the low pressure polymerization of ethylene to polymers ranging from butene to wax solids.

Ester Interchanges: A number of lithium compounds, such as lithium hydride, lithium hydroxide, lithium carbonate, lithium formate, lithium acetate, lithium 2-ethylhexoate, and lithium metal itself have been described as preferred catalysts for ester interchange reactions, such as the reactions between fats and oils and mono- or polyhydric alcohols. Lithium formate, acetate, and 2-ethyl hexoate were found to exhibit superior properties as catalysts for alkyd resin manufacture.

Antihistamine Manufacture: Allied to these applications is the use of lithium amide as a condensing agent for amines and alkyl or aryl halides. An outstanding example is its use in the manufacture of antihistamines, where it is preferred for its stability, ease of handling, higher yields and shorter reaction periods.

LCA Dispersions in New Solid Form Provide Greater Convenience and Safety

With the development of lithium dispersions in paraffin wax, LCA provides a new degree of convenience and safety in handling and using this increasingly important metal.

For laboratory use these solid dispersions are available in one inch-diameter rod form: larger shapes can be supplied for production runs. The metal content of this product is 30% by weight, and approximately 42% by volume, with an average particle size of 10-20 microns.

LITHIUM IN BRIEF

New developments involving lithium are constantly appearing in the literature. Each month some will be mentioned briefly here.

Alkylene dilithium compounds can be prepared by grinding granular lithium in the presence of alkylene dihalide in hydrocarbon solvent to get di-Li-alkylene (propylene or longer). (3453)

•

Poly-*p*-Li-styrene can be obtained from poly-halostyrene by reaction with Li or RLi. The macromolecular compound is very reactive and may be used for preparing numerous polystyrene derivatives. (3497) (3645)

•

Chloranilic acid is used as a reagent in the paper chromatography of alkali and alkaline earths. The test is sensitive to 0.5 microgram of lithium. (3612)

•

Generally good yields of gamma-keto acids can be obtained by the reaction of lithium salts of ketones with alpha-halo acids. (3502)

•

The corrosion of Type 304 stainless steel by molten lithium was studied at 800-1500°F in closed systems. (3616)

•

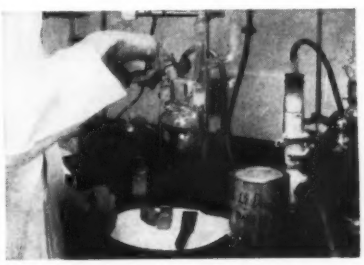
Synthesis of some colchicine derivatives involved bromination by reacting LiBr with tosylate, acylation of malonates with m-methoxybenzoyl chloride and $LiNH_2$, and reaction of Li-di-t-butyl-3,4,5-trimethoxybenzylmalonate with mixed anhydride. (3566)

•

Polymerization of conjugated diolefins can be achieved with a catalyst comprising metallic Li dispersed in a crystalline salt. (3483)

For further information, write our Technical Service Department, Bessemer City, N. C.

New LCA dispersions in rod form can be cut in open air to the amount desired.



Charging reaction flask with measured amount of solid dispersion.

Solid-form dispersions are less susceptible to reactions with air and water than dispersions in oil. The rods may be readily cut to any amount desired in open air. Dispersions in oil have the disadvantage of segregating in storage, requiring re-mixing, while dispersions in petrolatum are difficult to transfer to narrow-mouth or long-neck flasks. The new product overcomes these difficulties, resulting in greater convenience and safety.

The new LCA solid dispersions are expected to have wide acceptance in the organo-chemical field. Chemists are invited to write to Lithium Corporation of America for full information.

LITHIUM CORPORATION OF AMERICA, INC.

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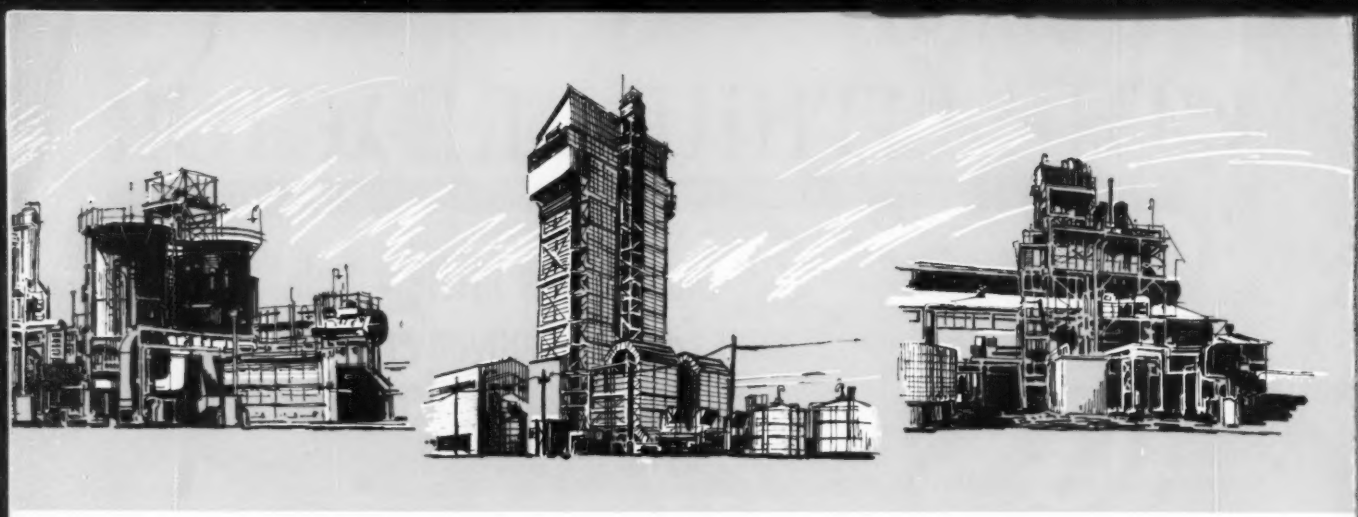


Chemicals for the soil...

Chemico has production-proven processes for the major fertilizer chemicals

ammonia / ammonium sulfate / ammonium nitrate
ammonium phosphate / superphosphate
triple superphosphate / urea / complex fertilizers
nitric acid / sulfuric acid / phosphoric acid

In India, Pakistan and Japan; in England, France and Italy; in Hawaii, Sumatra and Formosa; in Australia, South Africa and South America; in more than half the states of the Union and in every highly populated area on earth, Chemico-designed plants are producing basic fertilizer chemicals to increase world food production.

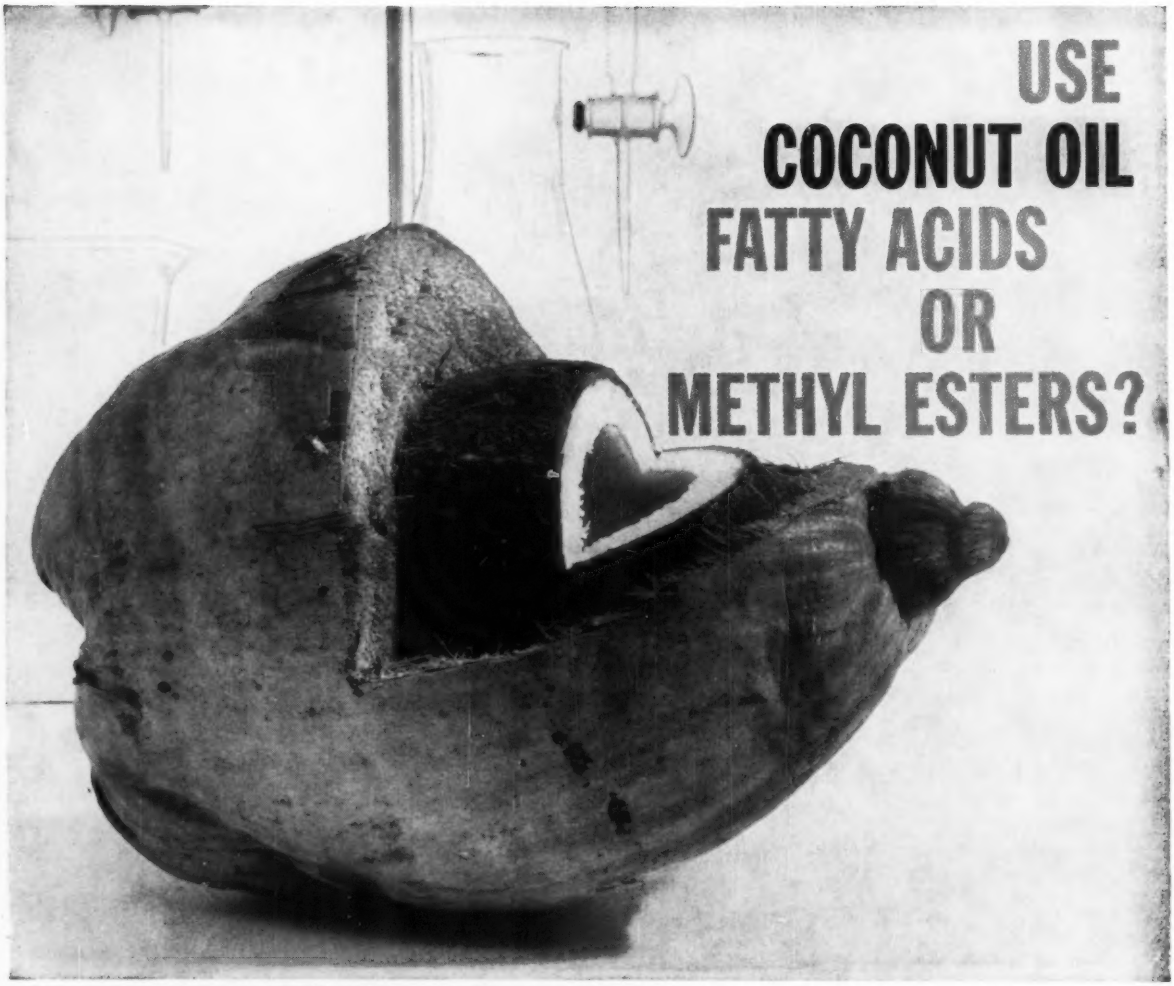
Chemico's experience in designing plants to produce fertilizer chemicals is unmatched by any other engineering company in the world. More than 200 Chemico sulfuric acid plants are now in operation. Sixty-five Chemico ammonia plants are on stream or under construction. In January of this year, Chemico completed its thirty-fourth nitric acid plant. Other Chemico plants now in production or under construction have capacities for producing 3,700,000 tons per year of ammonium sulfate and 1,600,000 tons per year of ammonium nitrate. When the capacity of the Chemico urea plants now under construction in Pakistan and the U. S. is added to what is being produced at plants in Japan, Canada and elsewhere in the U. S., the Chemico urea process will account for more than 400,000 tons per year.

Chemico's proven processes are transformed into efficient operating plants with maximum speed and with minimum expense to the client. Ease of start-up and low operating costs are just two of the more obvious advantages of Chemico plants. If your company is considering the construction of additional production facilities, or the expansion of your present plant, Chemico will help you find the most efficient and economical solutions to your process problems.

CHEMICO

CHEMICAL CONSTRUCTION CORPORATION
525 West 43rd Street, New York 36, New York

CHICAGO · DALLAS · PORTLAND, ORE. · HOUSTON · TORONTO · LONDON · PARIS · JOHANNESBURG · TOKYO



Foremost-El Dorado's non-secret ingredient is EXPERIENCE

When you specify Foremost-El Dorado fatty acids or methyl esters, you're buying products from people who are specialists in the field. For over 65 years, Foremost-El Dorado has been producing the highest quality coconut oil products available.

PURITY You can be sure of the highest purity coconut oil fatty acids and methyl esters on the market.

UNIFORMITY The shipment you get today will have the exact specifications as the last lot you ordered.

SERVICE You can relax. On-time delivery is certain. Foremost-El Dorado ships to your requirements—in drums, bags or tank cars. Also mixed compartment tank cars of acids and esters.

***If you have any unusual requirements, let our representatives work with you. For the Foremost-El Dorado Agent in your area, write or phone Department* CW-1160**

COCONUT OIL	
FATTY ACIDS	**METHYL ESTERS**
Caprylic	*Caproate*
Capric	*Caprylate*
Lauric	*Caprate*
Myristic	*Laurate*
Palmitic	*Myristate*
Cocoleic	*Palmitate*
*Eldhyco**	*Oleate*
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P. O. Box 599, Oakland 4, California

Profiling Staff Patterns for Profit

Some of the most detailed and up-to-date information on the staffing of the chemical, drug and manufacturing industries has just been compiled by the American Management Assn. The data, result of a broad new survey, show some wide variations, and general industrial profiles (like the simplified ones at right) can be drawn that gives process management a powerful tool for measuring how well it uses its manpower.

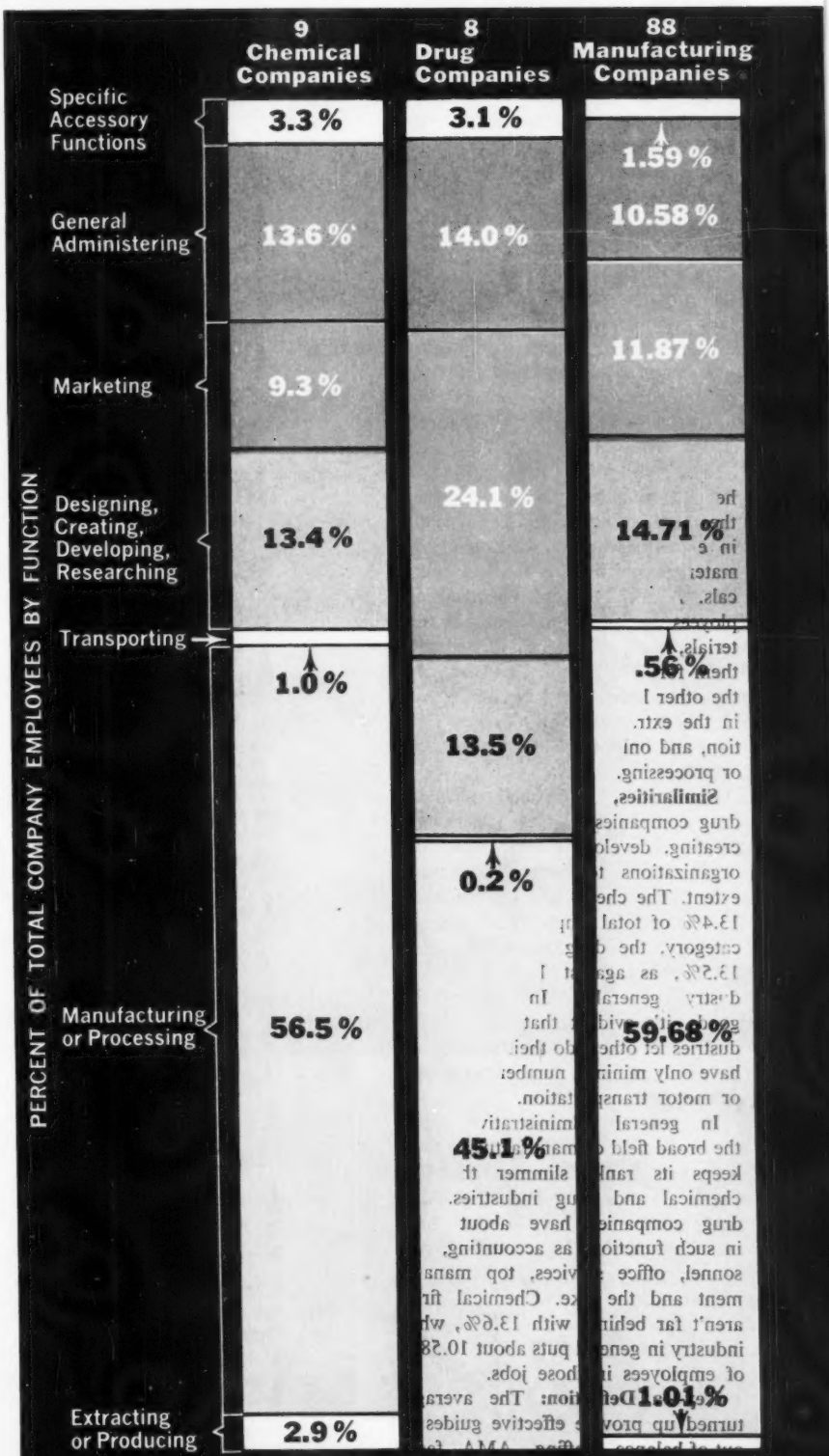
Already two major CPI firms—Merck and American Cyanamid—have put these profiles to good office (*see p. 70*).

The profiles are based on the averages of staff sizes for various functions. Such averages, while in no way regarded as standards, nevertheless show distinctly when a company has an unusually large (or small) number of employees performing these functions. And with that start, a company can concentrate its analysis of manpower where it does the most good, develop continuing criteria for guiding staffing programs.

AMA's survey, a follow-up of an earlier pilot study, is an intensive analysis of 88 manufacturing companies of all kinds, averaging about 11,550 employees each. Among them are nine chemical companies (average: 9,000 employees), eight drug and pharmaceutical firms (average: 5,025), and a half dozen others* in the processing field. AMA piloted the survey last year with 29 participating companies, now plans to keep it going on a full-scale basis. Now it covers firms with "total employment of more than 1 million, total sales in excess of $20 million."

How It Works: Each participating company fills out a questionnaire asking how many employees performed the 43 functions (*see p. 68*) and 19 subfunctions covered and defined by the survey. Using these, AMA compiles averages for each function on both industry and com-

* CPI companies: American Cyanamid, Canadian Industries Ltd., Chemstrand, Colgate-Palmolive, Continental Oil, Corn Products, Diamond Alkali, Ethyl, International Latex, International Minerals, Kimberly-Clark, Koppers, Eli Lilly, Mennen, Merck, Miles Laboratories, National Gypsum, Plax Corp., Schering, Smith Kline & French, Thiokol, Warner-Lambert, West Virginia Pulp and Paper, Wyandotte.



Including chemicals and drugs
Source: American Management Assn.

pany bases, also establishes medians, highs and lows in each category.

In their broadest categorization (*shown on p. 67*), the functions break down into seven areas of corporate activity: (1) extracting or producing, (2) manufacturing or processing, (3) transporting, (4) designing, creating, developing, researching, (5) marketing, (6) general administering, (7) specific accessory functions (a special grouping to cover functions such as cafeteria operation, which is often purchased or contracted for).

The industry profiles using these categories show clearly, for example, the emphasis placed on marketing by the drug industry, which mobilizes 24.1% of its employees to get its products bought. This contrasts with 9.3% of industrial chemical makers' staffs for marketing, and 11.87% for industry generally.

But where the drug industry is heavily weighted toward marketing, the chemical industry is heavily staffed in extracting and processing its raw materials and making finished chemicals. About 2.9% of chemical employees extract or produce raw materials, and another 56.6% process them for distribution. Drug firms, on the other hand, average no employees in the extracting or producing function, and only 45% in manufacturing or processing.

Similarities, Too: The chemical and drug companies staff their designing, creating, developing and researching organizations to roughly the same extent. The chemical firms put about 13.4% of total employment into this category, the drug companies about 13.5%, as against 14.71% for industry generally. In transporting goods, it's evident that all three industries let others do their work. Each have only minimal numbers in marine or motor transportation.

In general administrative areas, the broad field of manufacturing firms keeps its ranks slimmer than do chemical and drug industries. The drug companies have about 14% in such functions as accounting, personnel, office services, top management and the like. Chemical firms aren't far behind, with 13.6%, while industry in general puts about 10.58% of employees in those jobs.

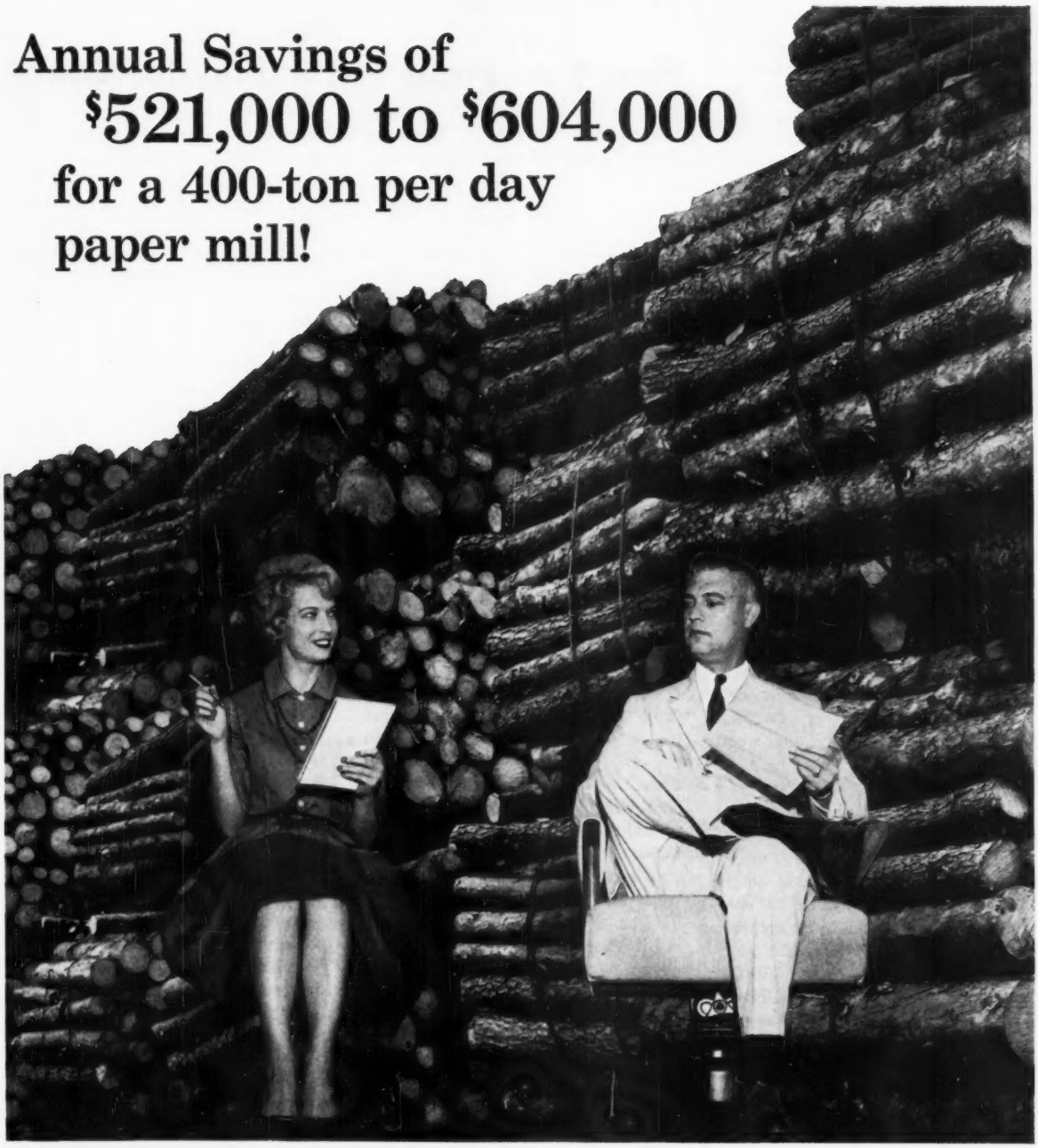
Key—a Definition: The averages turned up provide effective guides to out-of-balance staffing, AMA feels,

How Average Companies Deploy Workers

(Number of employees in functional groups)

Employees engaged in . . .	Mfg. Co. (11,551 workers)	Chem. Co. (9,067 workers)	Drug Co. (5,022 workers)
1. Extracting or Producing			
Production workers	72	175	—
Maintenance workers	16	55	—
First-level supervision	8	16	—
Management and staff	21	16	—
2. Manufacturing or Processing			
Production workers	3,977	2,340	1,170
Maintenance workers	617	1,017	315
First-line supervisors	274	356	113
Auxiliary service	1,783	1,119	540
Management and staff	206	305	113
3. Transporting			
Marine	5	10	—
Motor truck	42	50	10
All other	16	28	1
Management and staff	2	3	1
4. Designing, Creating, Developing, Researching			
Oriented toward extracting or producing	17	12	—
Oriented toward processing or manufacturing	456	313	108
Oriented toward products or marketing	777	289	162
Oriented toward facilities	85	157	47
Oriented toward new creations or discoveries	203	241	216
Auxiliary service	118	145	122
Management and staff	68	48	27
5. Marketing			
Sales representatives—consumer	191	151	596
First-line supervision—consumer	27	17	60
Sales representatives—industry	150	159	24
First-line supervision—industry	27	25	—
Customer servicing	778	309	265
Advertising and sales promotion	41	42	84
Market research and sales statistics	27	42	48
Management and staff	136	100	145
6. General Administering			
Accounting and auditing	316	269	175
Finance, insurance, tax	24	24	21
Economics, planning, budgeting	24	24	21
Credit and collection	24	12	28
Personnel	146	171	77
External relations	12	24	21
Purchasing	134	98	42
Traffic	49	110	21
Office services	158	144	105
General management auxiliary services	12	12	7
Operations improvement	146	208	56
Tabulating and electronic computing	109	61	77
Legal and secretarial	37	24	28
General management	37	49	21
7. Specific Accessory Functions			
	183	297	155

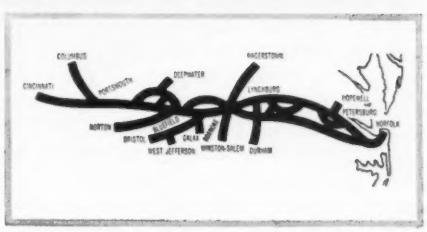
Annual Savings of $521,000 to $604,000 for a 400-ton per day paper mill!



It's a fact! Projected operating costs of a pulp paper mill on a site in N&W territory are far less than operating costs of mills now supplying this market. Actual savings are spelled out in an authoritative, recently-completed comparison made by Fantus Area Research, based on their years of plant location service. From it, you can see how transportation costs may be cut more than $400,000 — fuel, steam and power costs reduced as much as $200,000.

Other phases of the report analyze markets, labor, raw materials, taxes, industry trends — every factor pertinent to locating a mill at these profitable sites. Make sure your company is the one that capitalizes on this major competitive advantage. **Write on company letterhead to H. P. Cotton, Assistant Vice President, Norfolk and Western Railway, Roanoke, Virginia.**

MANY OTHER TYPES OF INDUSTRY can slash operating costs with plants in N&W territory. Fantus proves it in dollars and cents.



N&W

Nation's Going-est Railroad

because they are of "functions" rather than titles. Thus functions are grouped along the lines set (*see table, p. 68*) by the purpose of the job to be done, and people performing them are counted there, no matter where they appear on organization charts, or under what titles.

According to AMA's John Enell, who manages the Group Ten Manpower Utilization Research Project that conducts the surveys, the functional definitions were carefully worked out among participants in the project. Enell terms them "a real breakthrough on getting agreement among manufacturing companies of all types on categorizing people by the purposes for which they're hired, rather than nominal titles."

Big Deviations: The study shows that variations of 50% in manpower used to perform standard administrative tasks are common. In two industry groups, variations of 200% and 500% were discovered in general administration activity, AMA says, while one company found it had 700% more employees in personnel work, in proportion to the total work force, than another corporation in the same industry.

Companies report that since preliminary figures became available, savings have been effected ranging from $36,000 a year for a single operation in one company to more than $1 million annually by another. Such savings far outweigh the $475 annual fee for companies to join the project and the additional administrative costs in carrying out surveys. One company, for example, estimates that for the study of its 11,500 employees, it spent a total of $1,500-$2,000 for the initial survey and subsequent detailed analyses.

Outlook: AMA's survey has been called a "breakthrough in information availability." One manager sees even deeper implications, believes the results may eventually show that high administrative costs and high profitability go hand in hand in this era of volume operations and increasing automation. Certainly at least 88 companies are well ahead of competitors in gaining insight into their operations. For the future, as production workers dwindle relative to so-called overhead groups, look for more development of self-measurement techniques.

How Two Firms Put Survey to Work

To make a self-appraisal, companies first inventory functional groups relative to total company employment, and compare the results with the averages for companies in their field.

Says Enell, "If a company finds itself heavily over- or understaffed relative to the average for a function, it tries to figure out why. If the reasons are sound, and value received is commensurate with the expenditure of manpower and money, then the survey has helped to confirm the reasonableness of the organization. If the reasons aren't good, then the study has helped find an area where corrective measures may well be taken."

CPI Experience: A number of CPI firms are now making self-appraisals; and two, American Cyanamid and Merck, report definite gains. Both made their studies from last year's 29-company pilot survey.

Cyanamid found out it had several times the average ratio of people in the personnel functions, far more than probability would suggest. This led Robert Shull, manager of Cyanamid's administrative standards department, to count the number of people serving each division in such activities as employment and placement, training, wage and salary administration and the like. With the help of comparable information from five other drug and chemical companies, he was able to determine how and where Cyanamid's personnel staff outweighed most other companies'.

Among other findings, Shull reports, the company ranked first among 19 companies in people in health and safety, near the top in wage and salary administration and suggestion-system work, and fourth in three other functions. In no case did it rank less than seventh in the 19.

"In a number of cases," he says, "we found that staffing was completely justifiable. For example, in health and safety, the widespread nature of our business, with large plants in a number of locations, calls for well-staffed medical departments and safety sections. Therefore, some of our rather high staffing was reasonably accounted for."

Using the findings of the divisional surveys, Shull worked closely with divisional management to arrive at suggested ranges of staffing in the personnel function that would attain divisional goals, but with less duplication of activity or by elimination of unnecessary effort.

"On the basis of such analysis," he says, "we've suggested several attainable goals for the next several years that could let us reduce our level of personnel effort by possibly a fourth, and do it by means of normal attrition, transfer and promotion. In the long run, the savings in both effort and money could be substantial."

Message for Merck: At Merck, Robert Brown, the company's director of audit and measurement, said that examination of the study's gross results presented an impression that the company was weighty in a number of accounting functions. Before he could properly analyze the situation, however, Brown developed—with the help of 15 other companies in the AMA study—a number of comparisons aimed at finding suitable output expressions for the accounting group. For example the staffing measure used in accounts-receivable operations was the number of employees per 100,000 postings. In data processing it was the number of employees per 1 million tabulating cards used. With such measures Brown analyzed the entire accounting operation.

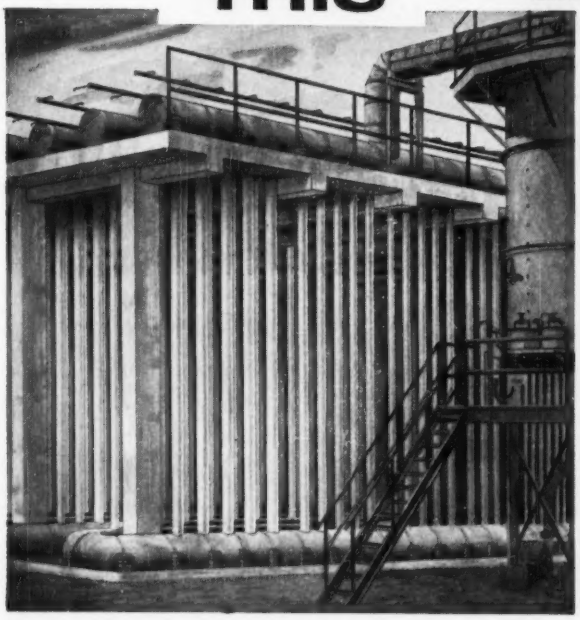
In four functions, he found, Merck was over the median among the 15 comparable companies, under in another four, and equal in three others. First attention, of course, will go to the relatively high areas.

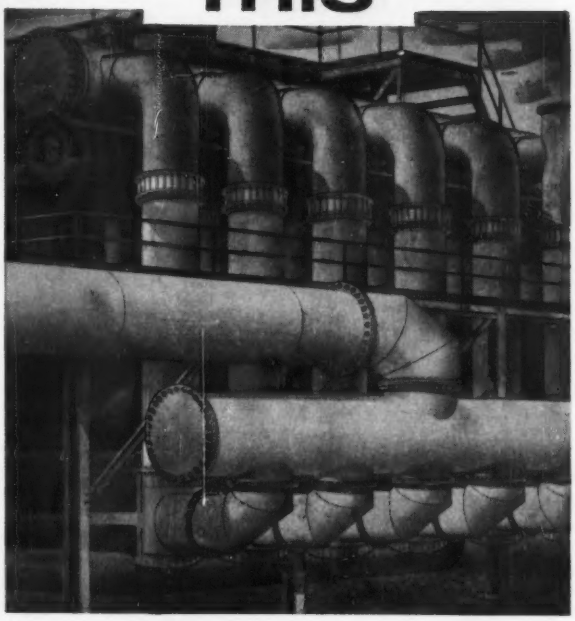
"These examinations of each function," Brown says, "help us to explain our differences from other companies, which we attributed generally to conditions under which the company operates. In our business we've got a great many small customers and it requires considerably more volume of accounting to transact business. Now we know specific areas to work in."

Merck hasn't yet reached any conclusions based on the survey. Right now the results are in the hands of management, who will study the findings, determine if any new criteria need to be adopted as long-term staffing guides.

THE DIFFERENCE BETWEEN

THIS and THIS





is corrosion-resistant

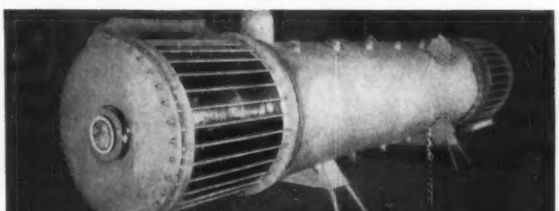
"KARBATE" IMPERVIOUS GRAPHITE HEAT EXCHANGERS!

Today, it doesn't make sense to sacrifice space, money, and minimum downtime by using heat exchangers not having the features of *unsurpassed corrosion-resistance, compactness, and low maintenance of "Karbate" impervious graphite exchangers.* Space was saved, piping simplified, and low maintenance was achieved when the "jungle" of single tube down-draft lead coolers (above left) was replaced by 6 compact "Karbate" shell and tube units (above right).

"Karbate" impervious graphite's high thermal conductivity and complete corrosion-resistance permit these heat exchangers to operate at higher velocities with associated increased heat transfer. This means that "Karbate" units with less surface area can thermally and economically replace larger metal exchangers in which high velocities produce localized accelerated corrosion. In such a case, "Karbate" exchangers with 83% less surface than carbon steel exchangers perform the same cooling job. And, at a total installed cost of approximately $10,000 less than the cost of retubing the corroded carbon steel exchangers with stainless steel tubes.

Actually, "Karbate" units offer unexcelled corrosion resistance at prices, in some instances, up to ⅓ less than many alloy and special metal units in which corrosion is measurable.

If you are considering a new heat exchanger installation, or if you have to replace or add to your present equipment, investigate the advantages of price, excellent corrosion-resistance, and trouble-free performance provided by "Karbate" impervious graphite shell and tube exchangers. For information, write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.



A 45" dia. "Karbate" shell and tube heat exchanger having 685 ⅞" I.D., 1¼" O.D. by 14' long tubes. It has an O.D. area of 3135 square feet.

"National", "Karbate" and "Union Carbide" are registered trade-marks for products of

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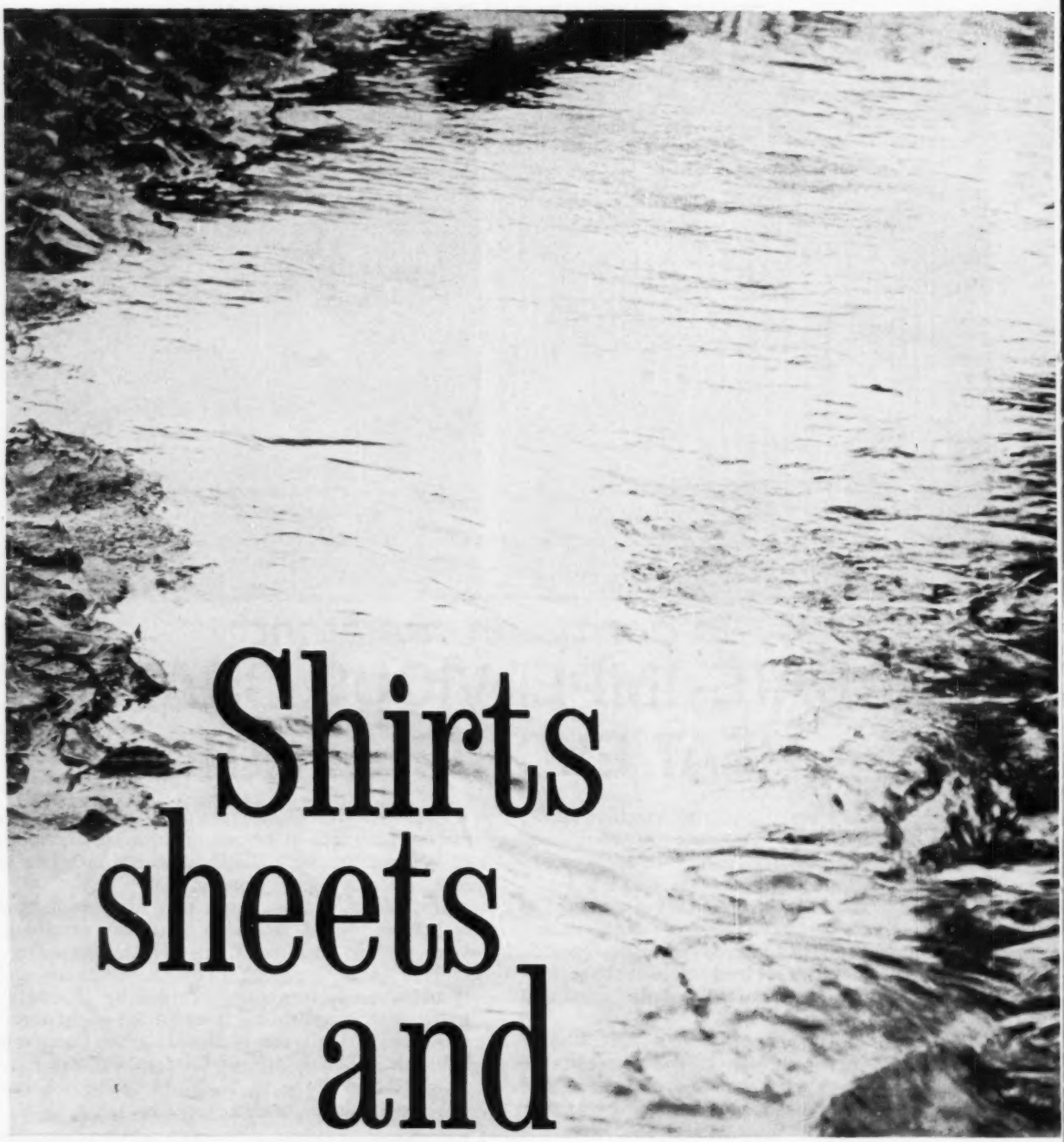
UNION CARBIDE



Shirts sheets and sequestering power

When Hooker's tetrapotassium pyrophosphate can put hard water like this to work, you can depend on it in your heavy-duty liquid detergent.

Hooker's tetrapotassium pyrophosphate has high sequestration power. Formulate it in your heavy-duty liquid detergent and it digs in deep to draw out dirt. It cleans badly soiled articles, even dissolves grease. Dirt can't sift back and cling to fabrics.

It's highly soluble—imparting high, uniform cleaning power throughout your product.

Hooker's tetrapotassium pyrophosphate *never varies in quality*. It's compounded from phosphoric acid and caustic potash, both made by Hooker, a pioneer in phosphorus and potassium chemicals.

Call your Hooker man or write us for any information you want.

TYPICAL ANALYSIS

$K_4P_2O_7$	95.5%
K_2O	56.9%
P_2O_5	42.9%
Total H_2O insoluble	0.01%
pH of 1% solution	10.

Used as a sequestering agent, water softener, dispersion and emulsifying agent in heavy-duty liquid detergents.

Granular form shipped in 100-lb. moisture-resistant paper bags.

HOOKER CHEMICAL CORPORATION

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HOOKER CHEMICALS PLASTICS

'Omnibus' Returns

Institutional prestige advertising in the chemical process industries got a boost this week with the return to television of "Omnibus" and its sponsor, Aluminium Ltd. Aluminium had sponsored the award-winning program during five previous seasons, but dropped it last year to direct its advertising dollars toward a harder selling campaign.

The company has now decided it can invest in prime network time and return with "Omnibus"—credited with widely publicizing the company's name and enhancing its reputation among customers. Seven "Omnibus" shows, devoted to history, music and the arts, will be presented during the next six months. Cost: about $1 million.

Last year's CPI leader in prestige advertising, Standard Oil Co. of New Jersey, this year dropped sponsorship of "The Play of the Week"—a highly successful dramatic program that it had rescued from sponsor abandonment (*CW, Jan. 30, p. 76*). Reason for dropping it: Jersey Standard spent a little less than $1 million for 18 weeks of the show last season, would have had to spend about $3 million for a full season this year (the program has a relatively small audience, is shown in only a few locations).

Since other sponsors rose to support the show this season, Jersey Standard retains the goodwill it won by having saved the show last year. Not a big television advertiser, Jersey Standard has discovered the value of prestige advertising, is now reportedly negotiating to buy a series of Shakespearian productions.

LABOR

Allied Settlement: The 750 striking employees at Allied Chemical's plastics and coal chemicals plant in Philadelphia returned to work after a 26-day strike. Oil, Chemical & Atomic Workers Union members, representing production workers, clerks and laboratory employees, were awarded an over-all 4% wage increase and improved seniority and sickness and accident benefits.

Major issue in the dispute was employment by the company of outside construction workers for plant work. The union contended that the work should be done by qualified union workers at the plant who had been laid off. Allied agreed to continue a past practice under which some construction work was assigned to regular employees, wherever practicable, without restricting the company's right to contract outside work. Settlement of this point terminated the strike.

•

Competing Unions: A strike against Bunker Hill Co., lead and zinc company in Kellogg, Ida., which started May 5, goes on, while opposing forces among the workers contend over which union local has the right to represent them. The power of the incumbent local of International Union of Mine, Mill & Smelter Workers is being challenged by a newly formed local, which claims support of 31% of the workers.

The president of the new local holds that the National Labor Relations Board can call for an election if more than 30% of the workers affected signed petitions seeking decertification of the old union. The president of the incumbent local questions the validity of the signatures. Meanwhile, the company has stopped all negotiations "until the issue of who shall represent the workers is decided."

LEGAL

Privacy Safeguarded: Chemical processors can breathe easier this week as a result of a U.S. Supreme Court action that keeps census material confidential. The court refused to review a lower-court decision holding that the Federal Trade Commission has no right to see "confidential" census reports prepared by manufacturers for the Bureau of the Census (*CW, Sept. 24, p. 32*).

The U.S. circuit court (Chicago) decision was appealed to the high court by FTC, which argued that the ruling would handicap enforcement of the antitrust laws. The Census Bureau, the Commerce Dept. and the Bureau of the Budget opposed FTC in the case, maintaining that effective reporting of census statistics would be hampered if FTC could demand "confidential" census information.

Beatrice Foods Co. (Chicago), the company that precipitated the fight by refusing to give FTC access to its "confidential" census report, said in its brief to the Supreme Court that the commission's effort "constitutes a shining example of the outer limits of bureaucratic zealousness."

•

Secret Formula Suit: Standard-Tech Industries (Philadelphia) has brought a $5-million lawsuit charging corporate raiding and theft of secret formulas by Sun Chemical Corp. (New York). The Philadelphia chemical, paint and shoe manufacturer was granted a temporary injunction against Sun to keep it from making or selling products based on the "secret formulas."

Sun agreed to an extension of the injunction while it prepares "a formal reply to the restraining order." Sun's president, Norman Alexander, says the suit is "completely without merit. The (coating) formulas are in the public domain furnished by general chemical manufacturers."

•

Pencils Seized: Erie County, New York, health department officials have ordered the seizure of about 500 advertising pencils reportedly containing potentially dangerous capsules of uranium ore. The health commissioner said the uranium ore—even though its radioactivity was not dangerous—would make children sick if they opened the capsule and swallowed the substance. The company using the pencils as advertising has cooperated in recalling them and warned the manufacturer of the hazard.

•

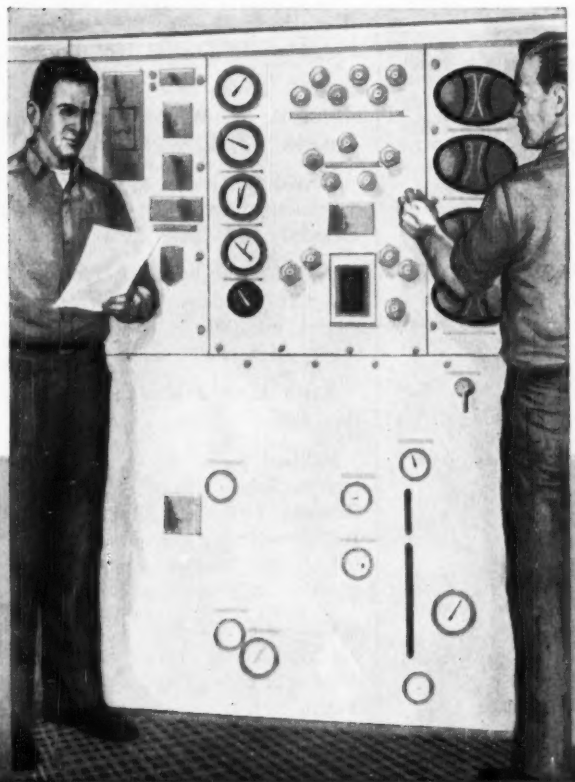
Cutter Consent: Cutter Laboratories, Inc., has consented to a Federal Trade Commission order barring it from quoting allegedly lower prices to big customers than to small ones for the same products. Cutter's agreement to end the practice, it emphasized, was for settlement purposes only, isn't an admission of guilt.

•

Pollution Control: Directors of the Bay Area (California) Air Pollution Control District have decided to leave enforcement of all regulations to the cities and counties within the district. The district control officer held that since the control agency has the responsibility of controlling smog, it should enforce regulations to this end. However, directors of the agency felt that the program would cost less with local enforcement, and that cities and counties should be given first chance.

SILENTLY SERVING NAVY'S POLARIS SUBS

Girdler scrubbers continuously pull atmospheric CO_2 out of the air



Atomic-powered Polaris Subs go around the world without surfacing — and can stay "hidden" for months at a time. The Sub's long-ranging endurance is only possible when — pound for pound — every piece of equipment aboard performs with maximum efficiency. Dependability is a must!

Girdler has been selected to build CO_2 Removal Units for most of the submarines in the current Polaris program. Two Girdler units are usually installed on each submarine, although one is sufficient to handle the load by itself. These units are easy to maintain, and require only 5 minutes of operator attention per hour.

The CO_2 removed by the Girdler scrubber is pumped into sea water where it quickly dissolves leaving no tell-tale air bubbles. Girdler's research and development work has been an important factor in developing the Navy CO_2 removal unit.

GIRDLER
CORPORATION
LOUISVILLE 1, KY.

designers and constructors of chemical plants for the construction of: Hydrogen ■ Carbon Monoxide ■ Carbon Dioxide ■ Ammonium Nitrate ■ Hydrogen Sulfide ■ Ammonia ■ Synthesis Gases ■ Hydrogen Cyanide ■ Anhydrous Hydrogen Chloride ■ Formaldehyde ■ Girbotol Gas Purification ■ Sulfur Recovery

NALCAMINE® G-39M

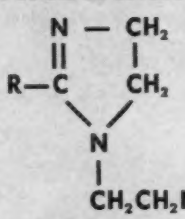
...This low cost fatty diamine makes high quality corrosion inhibitors!

Here's Why!

- It is strongly adsorbed on metallic surfaces . . . Contains *two* cationic centers, making it a really powerful surface active agent.
- It is *readily pourable*, for easiest handling.
- It exhibits excellent stability in corrosive environments.
- It is soluble in hydrocarbons . . . as the free diamine or as its salts of high molecular weight acids.
- It makes normally water-accepting surfaces oil wettable.
- It can be alkylated, oxyalkylated, quaternized or converted to salts of acids by neutralization.

Nalcamine G-39M has been designed expressly for use in products where pharmaceutical purity and color are not required. Thus it offers you all these important properties for a top corrosion inhibitor at a really *down to earth cost!*

THIS IS NALCAMINE® G-39M



Nalcamine G-39M is a mixture of diamino imidazolines, consisting predominantly of the diamine shown above where the mixed alkyl chains are heptadecenyl and heptadecadienyl.

TYPICAL ANALYSIS

Apparent Molecular Wt.	422
Apparent Combining Wt.	211
% Imidazoline	94.0
% Titratables	99.2
Spec. Gravity at 60°F.	0.948
Pour Point °F.	25
Viscosity at 60°F. cps	334
Density—Lbs. per gallon	7.91
Color	Black

SHIPPING

Nalcamine G-39M is shipped in fifty-four gallon, bung, unlined, non-returnable steel drums. Weight of each drum is approximately 420 lbs.

HANDLING

Nalcamine G-39M can be handled or stored in iron or mild steel. It should be stored in a closed container.

NALCO CHEMICAL COMPANY

6185 West 66th Place • Chicago 38, Illinois

Subsidiaries in England, Italy, Mexico, Spain, Venezuela and West Germany
In Canada—Alchem Limited, Burlington, Ontario

Nalco®

...Serving Industry through Practical Applied Science

KEY CHANGES

Carl A. Gerstacker to chairman of the board, **Herbert D. Doan** to executive vice-president, **John M. Henske** to manager, chemicals department, Dow Chemical Co. (Midland, Mich.).

Harold E. Thayer to president, **Charles D. Harrington** and **Frederick M. Belmore** to vice-presidents, Mallinckrodt Chemical Works (St. Louis).

C. Walker TenBroeck to chairman of the board, **Lee L. Blyer** to president, Howe & French, Inc. (Boston).

M. S. Green to chairman of the board, **R. H. Wright** to president, Armalite Co. Ltd. (Toronto, Ont.).

Harold G. Osborn to chairman of the board, Continental Carbon Co., subsidiary of Continental Oil Co.

Frank T. Jacobs to president, general manager, Jensen-Salsbery Laboratories, Inc. (Kansas City, Mo.), subsidiary of Richardson-Merrell, Inc.

Ralph A. Schweaikert to president, Bon Ami Co. (New York).

Ralstone R. Irvine to board of directors, **John Allegaert, William H. Bowman, Lyman C. Duncan, Daniel J. O'Connor, Jr.,** and **George W. Russell** to vice-presidents, American Cyanamid Co. (New York).

Charles G. Chisholm to vice-president, marketing, Haynes Stellite Co., division of Union Carbide Corp. (New York).

Ray H. Mulford to executive vice-president, Owens-Illinois Glass Co. (Toledo, O.).

L. F. A. Mitchell to vice-president, sales, Vitro Engineering Co., division of Vitro Corp. of America (New York).

Norris D. Embree to vice-president, technical operations, Distillation Products Industries (Rochester, N.Y.), subsidiary of Eastman Kodak Co.

Thomas R. Weymouth to vice-president, general manager, Phillips-Foscue Corp. (High Point, N. C.), subsidiary of Nease Chemical Co.

Paul J. LaMarche to vice-president, production, U. S. Industrial Chemicals Co., division of National Distillers and Chemical Corp. (New York).

Stauffer Chemical New Producer in Liquid SO_2 Field

Stauffer Chemical Company, through its Consolidated Chemical Industries Division, is adding liquid sulfur dioxide to its broad list of basic chemicals. A new plant for production of this product is now under cons... Rouge, La. The pla... in production befor...

Capacity is expe... tons a year and wi... dition to national ... widely used in the ... cal business and ... supply.

Edward S. Roth... of Stauffer's Consoli... dustries Division ... that deliveri...

addition to a basic ... for shortage than ... into the Baton ... plex is no novelty, ... ted Chemical In... has been making ... nd sulfuric acid ... many years and ...

Pulp Mills Beginning Novembe...

One of this city's big industries is about to add substantially to its operations. Consolidated Chemical Industries, long established in Baton Rouge in the manufacture of aluminum chl...

ing of glass, gelatin, glue, kaolin, resorcinol, soybeans and starch.

Capacity of the new plant will run to 10,000 tons or more per year and represent a substantial addition to nationa... availability of a product whic... is often in short supply.

Edward S. Rothrock, Senio... Vice-President of Stauffe... Chemical Company, and Ge... eral Manager of its Conso... dated Chemical Industries D... ision, states that distributi... f sulfur dioxide will be ma... y tank car and tank tru... hroughout the Southwe... outheast, Midwest and Mo... in states.

Substantial addition ... available supply of sulfur dioxide

Consolidated Chemical ... tries Division of Stauffer C... cal Company is building ... plant at Baton Rouge, La., to ... duce 10,000 tons or more per ... of liquid sulfur dioxide. The ... plant will service pulp and pa... and chemical plants within a ... dius of about 1000 miles or mo... Deliveries will be in tank car a... tank truck quantities, accordi... to Edward ... othro... Gen... Manager of ... nsolid... ... quarters at ... uston, ...

Stauffe... ...n ... it ... oa... range of basic chemicals, of ... aluminum chloride and sulfuric ... acid, made at Baton Rouge, and ... chlorine and sulfurs are other ... major products.

It is expected that the new ... sulfur dioxide ...

Sulfur

New Source for S... states

One of the big c... of Baton Rouge is ... stantially to its o... dated Chemical ... established in Ba... manufacture of ... and sulfuric acid, ... plant for the mar... sulfur dioxide.

The plant, wit... facilities, railroa... scaped area, will ... ground. Liquid ... widely used as a ... he paper industr... eather tanning, ... ng, textile and w... the processing ... ue, kaolin, resor... arch.

Capacity of the ...

news / Stauffer Chemical Company

Consolidated Chemical Industries Division, Houston, Texas

STAUFFER BUILDS SULFUR DIOXIDE PLANT AT BATON ROUGE

Stauffer Chemical Company's Consolidated Chemical Industries Division has begun construction of a plant at Baton Rouge, Louisiana, to produce liquid sulfur dioxide. Scheduled to be on stream by November 1, the project will have a rated capacity of 10,000 tons per year.

LIQUID SO_2

Stauffer CHEMICAL CO.

New York • San Francisco • Chicago • Akron • Houston • Omaha • Los Angeles • ... • Mo. Portland • Weslaco • Lubbock • Harvey • No. Little Rock

New Source of Liquid SO_2

Consolidated Chemical Industries Division of Stauffer Chemical Company will deliver 10,000 tons per year from new plant at Baton Rouge.

Stauffer Chemical Company's new plant at Baton Rouge will be on stream by November 1 and is scheduled to deliver sulfur dioxide in tank car or tank truck quantities over a radius of 1000 miles or more.

The new operation puts Stauffer close to many of the biggest pulp and paper manufacturers and many of the great chemical companies. Pulp and paper manufacturers are major users, to be sure, but the "minor" users in leather, oil and sugar refining, textiles, water treatment and other C.P.I. fields run into thousands of tons a year.

The new 10,000 or more tons per year of sulfur dioxide which Stauffer will make available are a needed addition to a basic supply better known for shortage than for surplus.

Stauffer's entry into the Baton Rouge chemical complex is no novelty, since its Consolidated Chemical Industries Division has been making aluminum chloride and sulfuric acid in this location for many years. The manufacture of these products will continue, of course.

...ew Source of Liquid Sulfu... ...at Baton Rouge, Louisiana

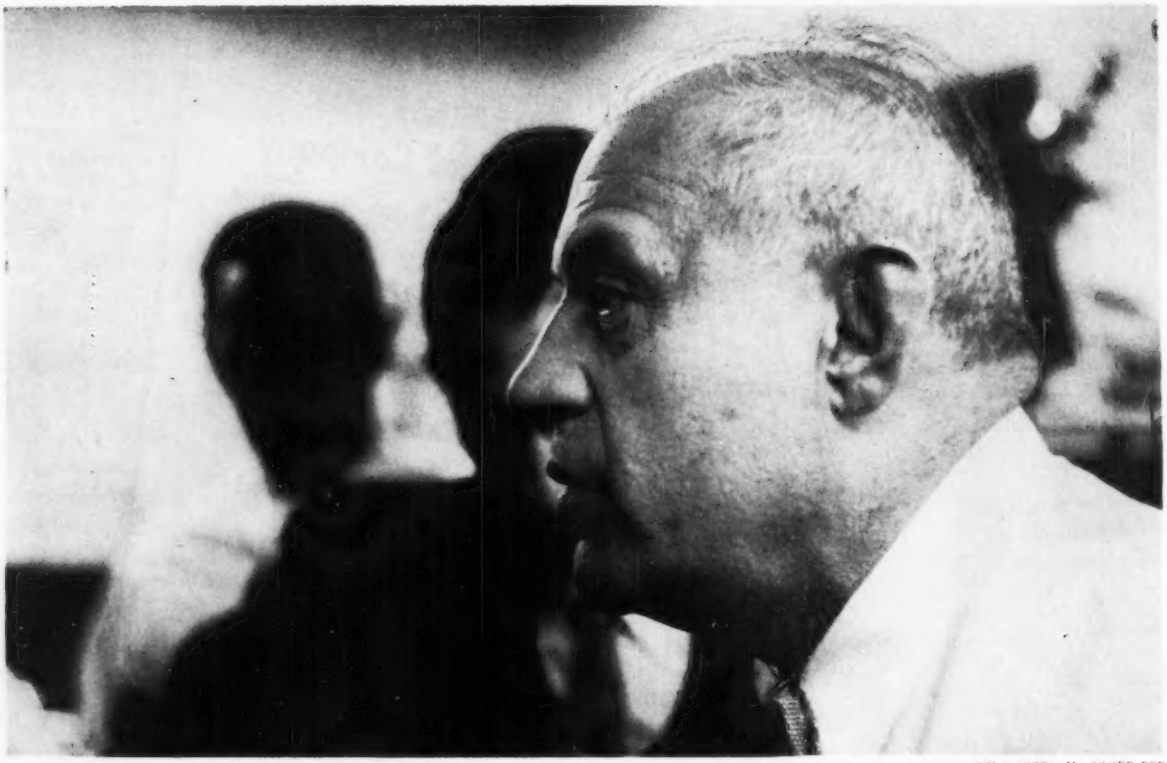
...Stauffer Chemical Company's new ...nt at Baton Rouge will be on stream ...t November 1 and ready to deliver ...ur dioxide in tank car or tank ... quantities over a radius of 1000 ... or more.

...e new operation puts Stauffer ...to many of the biggest pulp and ...manufacturers and many of the ...chemical companies. Pulp and ...manufacturers are major users, ...ure, but the "minor" users in ... oil and sugar refining, tex... ...er treatment and other C.P.I. ...e thousands of tons annually.

The new ... year which ... able are a ... supply bette... for surplus.

Stauffer's ... Rouge chemic... since its Con... dustries Divis... aluminum chlo... in this location ... will continue to ...

Stauffer Cher... plant at Baton R... by November 1.



CW PHOTO—M. SCHREIBER

Leslie Gulton spurs development of new, more powerful transducers for chemical processing jobs.

Putting New Power into Chemical Processes

This week Gulton Industries, Inc., is completing a new furnace for firing large ceramic transducers. When it goes into production in another month, it could provide transducers—devices that directly convert electrical energy into mechanical energy and vice versa—that will actually do the myriad CPI jobs for which they have long shown promise.

The furnace, which will operate on a recently patented pressure-firing process,* will turn out more powerful transducers with a wide range of ceramic ferroelectric compositions for activating and controlling chemical processes. "For the first time, we can talk of transducer power in terms of kilowatts instead of watts or fractions of watts," says ebullient, shirt-sleeved Leslie K. Gulton (*above*), who directs the operations of his Metuchen, N.J., firm.

Until now, the lack of power has relegated transducers to low-powered electronic circuits. And it has helped sully the reputation of ultrasonics (the use of high-frequency mechanical vibrations from a transducer), which was once billed as the solution of a limitless number of problems.

Ultrasonics have done relatively well in the simplest application—cleaning and degreasing. But in other cases, ultrasonics have not lived up to the billings. Ultrasonic welding, for example, has yet to reach the stage where it is practical for more than thin gauges of metals such as aluminum (*CW, Dec. 20, '58, p. 65*).

Mixing of liquids by ultrasonics has been given little serious consideration because the vibrations don't "stir" any deeper than a few inches. Now Gulton hopefully talks in terms of penetration of several feet for mixing. (The transducers could be placed on the inside or outside of vessels.) He also mentions the possibilities of degassing and improved polymerization reactions. Transducers attached to heat exchangers can improve heat transfer. And in exothermic reactions, transducers can improve dispersion, increase surface contact—perhaps increase reaction rates even at lower temperatures and cut side reactions because of increased mixing.

New Optimism: Much of what Gulton says sounds like a booming echo of past trade talk. But now there is a difference—for although much is still speculation that must be proved out in both laboratory and plant, there is solid basis for optimism.

The firm's new furnace will turn out transducers that are 2 ft. x 2 ft. (576-sq.in. area). Power ratings are about 40 watts/sq.in., which means that Gulton is talking in terms of 20

* U. S. patent 2,956,327, issued Oct. 18 to Jean-Pierre Borel and Lucien A. Petermann and assigned to Gulton Industries, covers the production of ceramic (nonmetallic) ferroelectric and piezoelectric bodies; it also covers the finished products.

6 widely used Blockson phosphates

their properties, uses and specific applications -particularly in synthetic and soap based cleaners

FOR DATA BULLETINS CHECK SQUARES AND MAIL THIS AD WITH YOUR CARD OR LETTERHEAD

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☐ **BLOCKSON TRISODIUM PHOSPHATE**

This is the original all-purpose cleaner and still the most widely used. An excellent emulsifier and saponifier. Nothing beats it for removing fat, grease and oil-based soils. Offers a top combination of buffered high alkalinity *without* causticity. A superior base for building your improved detergents. Widely used in machine dish detergents, heavy duty, floor and metal cleaners. Check square for data bulletin.

☐ **BLOCKSON TRISODIUM PHOSPHATE CHLORINATED**

A *must* for proper cleaning of hard surfaces, especially, glazed and ceramic. Boosts any dish detergent's cleaning power and rinsing action. An excellent destainer and bleacher; its chlorine is readily available. A top sanitizing agent and disinfectant. Sold under approved labels to breweries, dairies and canners. An important component in the new high-efficiency abrasive home cleaners.

☐ **BLOCKSON SODIUM TRIPOLYPHOSPHATE**

The preferred all-purpose complex phosphate. Affords outstanding hard water control. Its synergism boosts the cleaning power of other components in your mix, particularly the wetting agents. Costs less than the replaced synthetics. Ends need to use harsh alkalis in formulation to offset high wetting agent cost. Superior buffering, sequestration and peptizing. Used in dish and laundry detergents and in floor, wall and metal cleaners.

☐ **BLOCKSON TETRASODIUM PYROPHOSPHATE**

A buffered synergist, sequestrant and dispersant. Free from the high alkalinity and causticity of other builders. Softens water without precipitating soils on surfaces. Enhances any formulation's free-rinsing performance. High solution stability. Used in dish detergents, vat cleaners and when the dispersion and viscosity reduction of a complex phosphate is required, as in clays and pigments and slurries.

☐ **BLOCKSON POLYPHOS**
(Sodium Hexametaphosphate 67% P_2O_5)

Highest phosphate content, solubility and water softening capacity of all sodium phosphates. Less Polyphos needed, so more room for your alkali —which is not used up in water softening since Polyphos softens by sequestration. Boosts action of wetting agent. Inhibits film. Buffered pH. For machine dish detergents, quality dairy and laundry cleaners, well-drilling muds and wherever a glass phosphate is indicated.

☐ **BLOCKSON TETRAPOTASSIUM PYROPHOSPHATE**

The phosphate base for the newer all-purpose liquid cleaners and concentrates. High Solubility—200 parts TKPP in 100 parts water at 50°F. Its synergism multiplies any formulation's hard-surface detergency. A powerful sequestrant-water softener; peak detergency in any hardness area. Prevents film, boosts rinsing action. Compatible with other components in your formulations; assures crystal-clear shelf life.

BLOCKSON **BLOCKSON CHEMICAL COMPANY**

Chemicals Division, **Olin Mathieson Chemical Corporation,** *Joliet, Ill.*

kilowatts of power for large transducers.

The 2-ft.-square transducers haven't been made yet, but the company has been producing 6-in.-square, 1-5-kw. transducers for about a year. "Furnace size is the only limitation right now. Technical problems have been solved," says Gulton.

Pressure Under Fire: The key to producing large transducers is in firing the ceramic materials under pressure. And Gulton has had plenty of time to solve the problems of the technique. The patent application on pressure firing was filed Jan. 22, '54; the patent didn't issue until last month —although a German patent issued some time earlier.

Gulton isn't unhappy that it took six years to get a U.S. patent. "In addition to giving us time to perfect techniques, it means that we'll be protected that much longer. And we are more certain of the soundness of our patent position since we had more than the usual trouble in winning it," says Gulton.

According to the patent, firing at pressures of at least 5 atmospheres increases the product's density, improves homogeneity, reduces internal stress and improves electrical and mechanical properties. Large shapes can be fired without the danger of cracking due to shrinkage. (In ordinary firing, shrinkage can run as high as 20%, according to the patent.) And finished shapes can be produced without machining and cutting.

The pressure-firing technique reduces voids 85%. Most dense ceramics now offered have a density of about 7.5 gm./cc., according to Gulton. At patent filing time, pressure firing gave densities of 8.0 gm./cc.—and now the firm is producing transducers with 8.09 densities. (Theoretically, the highest X-ray density possible is 8.1, according to Gulton.)

But producing large transducers that are stronger mechanically is only one feature of pressure firing. Of equal importance: firing under pressure permits the incorporation of chemicals that would normally vaporize. This permits tailor-making compositions to do specific jobs, particularly in temperature measurement where transducers have the advantage of giving instantaneous readings.

The ceramics have critical temperatures, called Curie Points, beyond which the mechanical and electrical properties are reduced. If a process requires temperature measurement within a critical temperature range, Gulton is now able to work with a number of chemical compositions in order to obtain the best results.

Transducers can be tailor-made to measure temperature changes between 47.1 and 47.2 C, for example, within a few microseconds. And Gulton claims transducers can be made that will accurately measure temperature changes of a few millionths of a degree.

One chemical formulation has resulted in a ceramic that gives a direct digital readout on temperature change —i.e., at one temperature it sends out a signal with a specific number of pulses; at another temperature, a different number of pulses. "We feel we can come up with other chemical compositions that will give us direct digital readout of pressure and vibration measurements," says Ed Cohen, assistant to Gulton.

Direct digital readout transducers are still in the experimental stage. But when—and if—they come out of the laboratory, they could be a boon to computer-controlled operations.

Complete Systems: Closer to plant application is a temperature-measuring transducer being custom-made for a chemical company. Gulton Industries will design and build the control loop as well as supply the transducer. Gulton feels that since his firm best understands the capabilities of the sensitive transducers, it can best design the control loop.

The company is ready to develop control systems for most any application. But it will not be establishing a precedent if it winds up in the control field. Five years ago it started out with ceramics that were used in the medical field for physiological measurements. It is now offering a medical system for 14 physiological measurements. It has also been cosponsor with Hersey-Sparling Meter Co. of an ultrasonic flowmeter (*CW, March 19, p. 50*) for water and sewage. And it is also now carrying through on its own in adapting the meter for other flow problems.

After numerous setbacks, it looks as if transducers are now about to begin living up to some of the colorful claims originally made for them in chemical processing.

General Mills Chemicals

On time... all the time

Midnight, 6 AM, high noon, or 6 PM . . . 24 hours a day the tankcars roll from General Mills Chemical Division in Kankakee, Illinois, the heart of mid America. The high grade chemicals are on their way to a host of diversified industries. Each shipment leaves on time, every time.

Production men around the world have come to know General Mills Chemicals as a dependable source of supply.

Here at the Chemical Division, we take pride in our reputation. Production manager, traffic manager, shipping clerk . . . the whole team works with one goal in mind—on time delivery, all the time. Why? Because we all know the production bottlenecks that develop when shipping dates are missed. It won't happen when you deal with General Mills.

You can't see this dependability in a General Mills sample case, but it's there and it's mighty important. The best way to sample it is to try General Mills Chemical Division as a source of supply.

General Mills

SURFACE FILMING... this key property of Fatty Nitrogen Chemicals inhibits corrosion

General Mills Fatty Nitrogen Chemicals are cationic surface active agents that adsorb on metal as a monomolecular film and shield the metal from corrosive environment. In the production, storage, transportation and refining of corrosive crude oil, small amounts of inhibitors based on Fatty Nitrogen Chemicals form a film on the metal surfaces of storage tanks, pipelines and other equipment, preventing corrosion.

In another surface filming application, Fatty Nitrogen Chemicals are sprayed on soil and form a film on individual clay particles to act as an efficient soil stabilizing agent.

Surface filming, along with the other key properties listed at right, have made Fatty Nitrogen cationic surfactants valuable to many industries. Check and see what they can do for you.

OTHER KEY FATTY NITROGEN PROPERTIES:

- ☑ **Lubricity**—adsorbs on fiber and fabrics, lubricates and confers softness.
- ☑ **Selective Adsorption**—adsorbs on certain non-metallic minerals.
- ☑ **Solubility**—Wide range of solubilities in a variety of polar and non-polar solvents.
- ☑ **Chemical Reactivity**—unique "building blocks" for organic chemical synthesis.
- ☑ **Surface Activity**—cationic emulsifiers, wetting agents and detergents.
- ☑ **Biocidal Activity**—inactivates certain bacteria, fungi and algae.

Send for a new 40 page technical bulletin, "Fatty Nitrogen Chemicals for Industry." Write to General Mills Chemical Division, Kankakee, Illinois.

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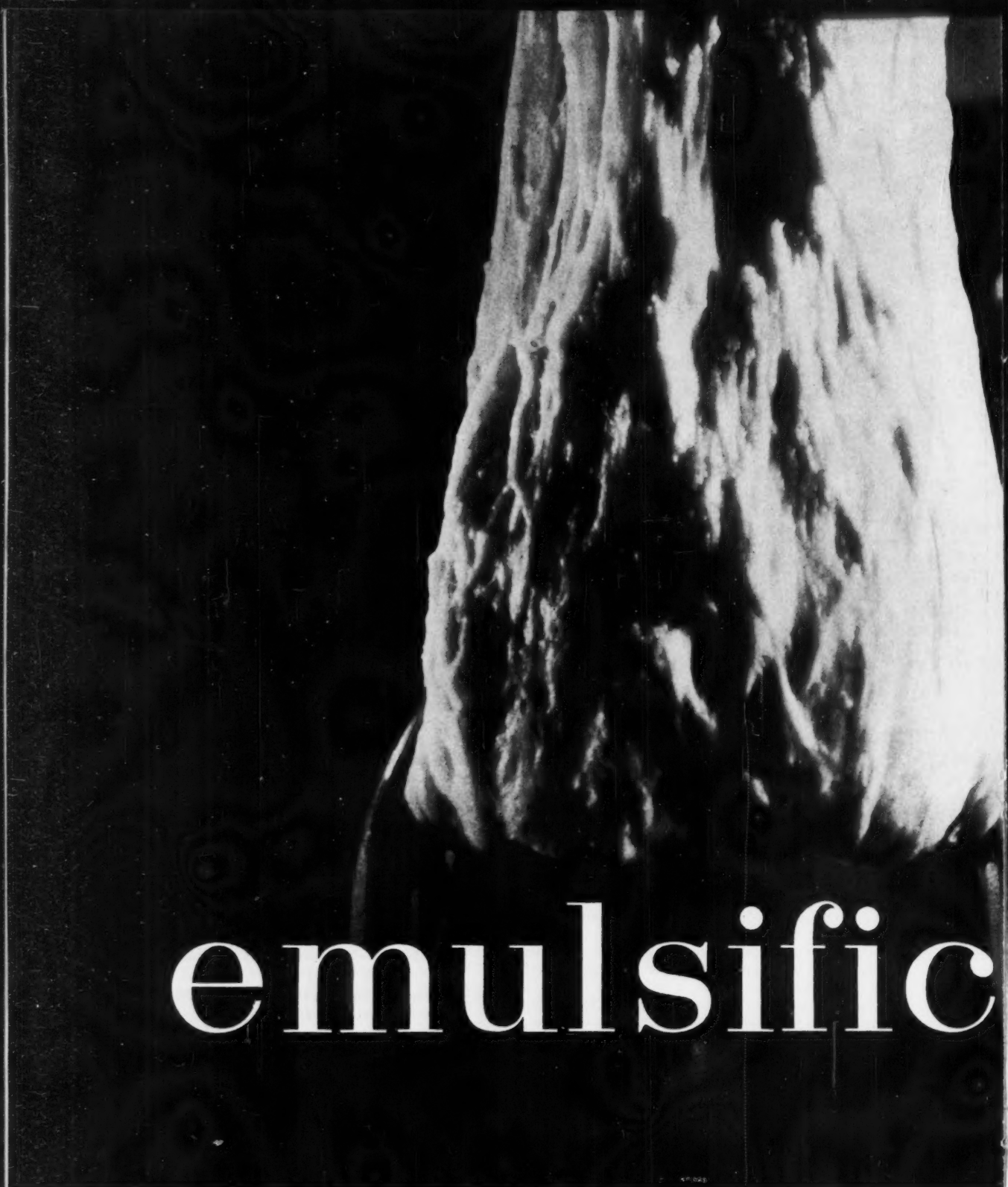
CHEMICAL DIVISION, Kankakee, Illinois and Tlalnepantla, Mexico

SALES OFFICES: New York, Boston, Philadelphia, Detroit, Charlotte, Cleveland, San Francisco, Houston, St. Louis, Los Angeles, Kankakee

Fatty Nitrogen Chemicals • Versamid® Polyamide Resins • GenEpoxy® Epoxy Resins • Deriphat® Amphoteric Surfactants Steroids • Genamid® Epoxy Curing Agents



Testing the extensibility of bread dough in Atlas laboratories.

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...and they improve shortening and cake mixes, too. When food
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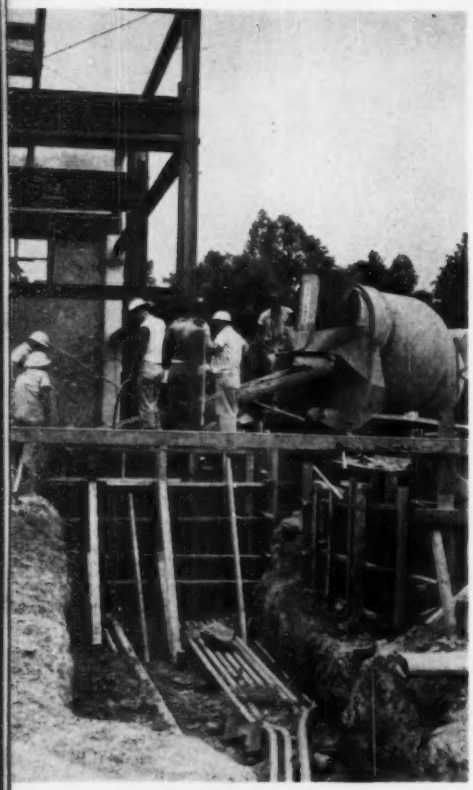


JULY 12: Pedestals are poured.

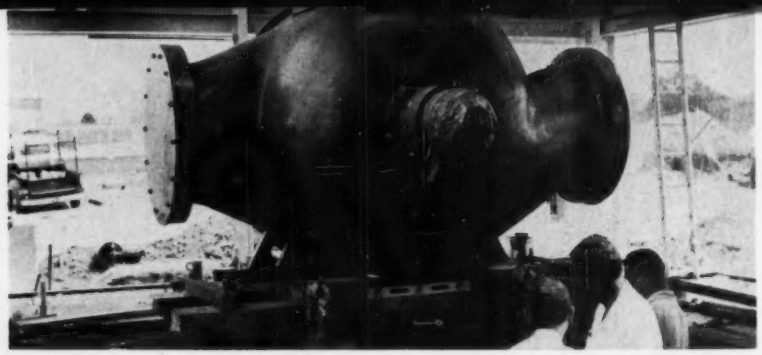
Jet Power in Jig Time

At Possum Trot, near Clementsville, Ky., the first jet engine-gas turbine power plant purred quietly into action last week (*CW Technology Newsletter, Nov. 19*). One of its main features: it can be installed in a hurry—as the pictures show.

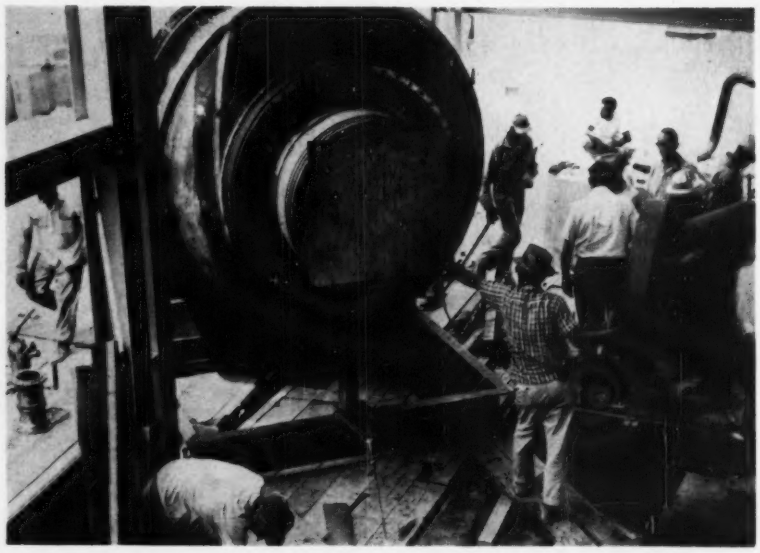
It has been just over a year since the operator, Columbia Gas System's Columbia Gulf Transmission Co. subsidiary, filed plans to build the gas pipeline compressor station using the Cooper-Bessemer and Pratt & Whitney power package.

The J-57 jet engine was put into place in one day, bearing out Cooper-Bessemer's contention that an engine can be replaced in a few hours for maintenance overhaul.

OCTOBER: Linked units of gas turbine are ready for test startup.

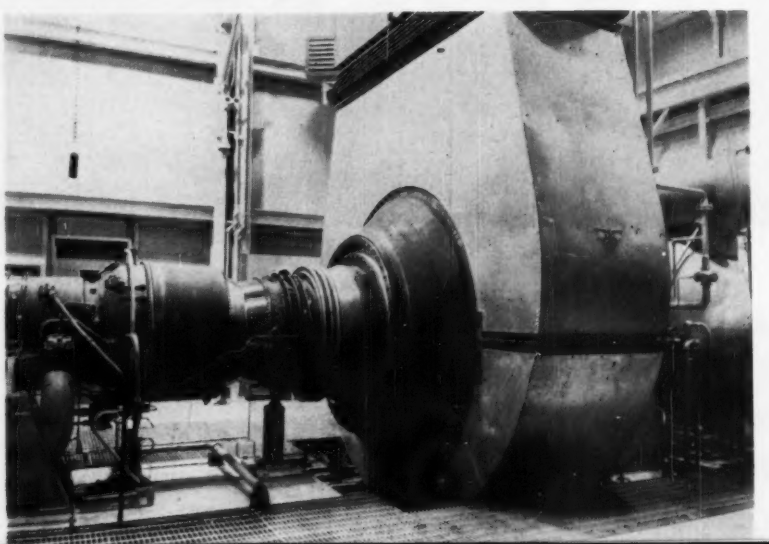


AUG. 1: Centrifugal compressor is first unit moved into place.

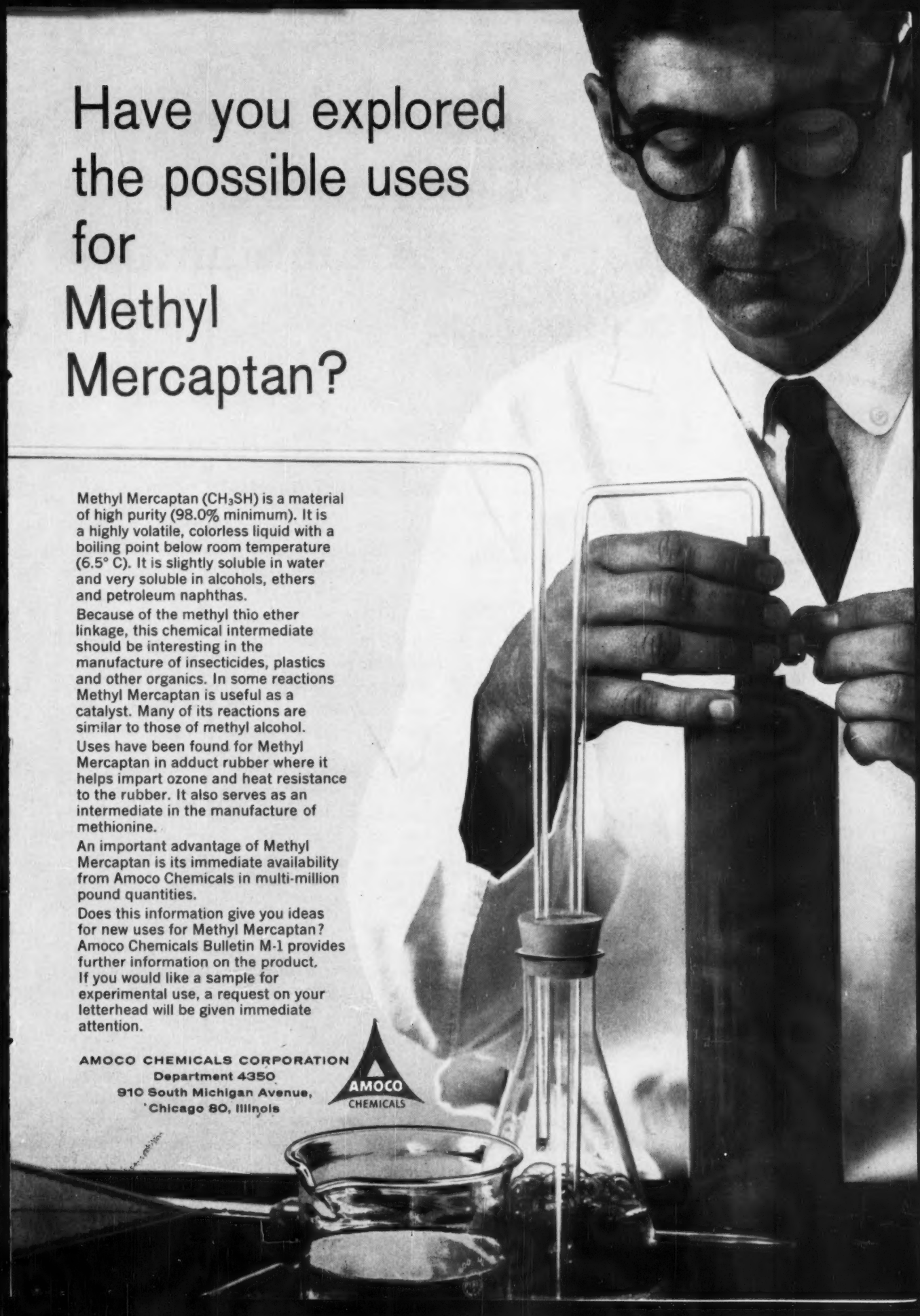


AUG. 16: 29,000-lb. power turbine is set onto its foundation.

AUG. 25: 4,000-lb. J-57 jet engine is swung into building.



Have you explored the possible uses for Methyl Mercaptan?



Methyl Mercaptan (CH_3SH) is a material of high purity (98.0% minimum). It is a highly volatile, colorless liquid with a boiling point below room temperature (6.5° C). It is slightly soluble in water and very soluble in alcohols, ethers and petroleum naphthas.

Because of the methyl thio ether linkage, this chemical intermediate should be interesting in the manufacture of insecticides, plastics and other organics. In some reactions Methyl Mercaptan is useful as a catalyst. Many of its reactions are similar to those of methyl alcohol.

Uses have been found for Methyl Mercaptan in adduct rubber where it helps impart ozone and heat resistance to the rubber. It also serves as an intermediate in the manufacture of methionine.

An important advantage of Methyl Mercaptan is its immediate availability from Amoco Chemicals in multi-million pound quantities.

Does this information give you ideas for new uses for Methyl Mercaptan? Amoco Chemicals Bulletin M-1 provides further information on the product. If you would like a sample for experimental use, a request on your letterhead will be given immediate attention.

AMOCO CHEMICALS CORPORATION
Department 4350
910 South Michigan Avenue,
Chicago 80, Illinois

AMOCO
CHEMICALS

What you should know about the economics of Reynolds Aluminum Process Pipe

Reynolds Aluminum Process Pipe—strong, lightweight, and corrosion-resistant—costs no more than cold rolled black steel or galvanized steel pipe, when you consider the total installed cost. For example, the table below shows that the base price of Reynolds Aluminum Heavy-End Pipe is almost as low as galvanized steel. Shipping and installation costs for aluminum pipe are invariably lower than heavier pipe—usually from 15 to 30% less.

PIPE COSTS COMPARED

4" Schedule 40 Pipe (Plain End) 100 feet	*Carload Price	Freight to West Texas from Eastern U.S.	Total
Black Steel	98.37	15.86	114.23
Galvanized Steel	117.72	15.86	133.58
Aluminum Heavy End* Alloy 6063-T6	143.75	—(1)	143.75
Aluminum Alloy 6063-T6	179.15	—(1)	179.15
Stainless Steel 304 Schd. 10	621.77	15.86	637.63
Stainless Steel 304 Schd. 40	1065.80	15.86	1081.66

*Quoted as of March 25,1960 (1) Aluminum prices include delivery charges

The table also shows that aluminum pipe is the lowest-cost corrosion-resistant pipe you can buy. Reynolds Aluminum Heavy End Pipe costs about 1/4 as much as stainless 304, Schedule 10, and about 1/7 as much as stainless 304, Schedule 40.

RESISTS CORROSION, WON'T RUST OR CONTAMINATE

The list of corrosive chemicals and process products that aluminum can handle is a long one, and it includes fluids that rapidly corrode other metals. Corrosion-resisting aluminum is ideal for process operations in the chemical, food, beverage, soap, drug, petroleum and petrochemical industries.

LIGHTWEIGHT, BUT STRONG

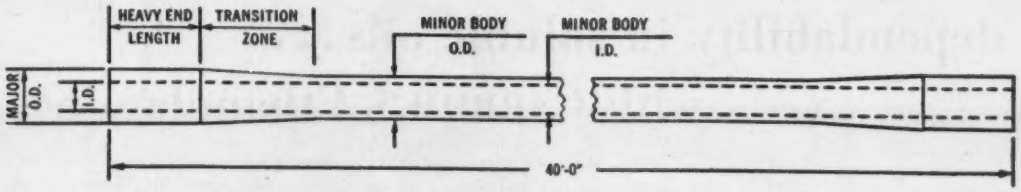
Only one-third as heavy as steel, Reynolds Aluminum Pipe costs less to handle, to ship, and to install. It requires less support, and is easier to move for temporary installations. Yet, aluminum is strong—strong enough to take rough handling and normal operating pressures. In fact, at lower temperatures (down to −320°F) where some metals grow brittle and weak, aluminum is actually *stronger*, with improved tensile and yield strengths, and ductility.

EASY TO WORK, WELD, JOIN

Aluminum is one of the easiest metals to form, bend, cut and join. It welds speedily and securely by any common welding method. You can choose from a large variety of forged and cast aluminum fittings, flanges and couplings for grooved, threaded, and welded joints. This means more design flexibility, lower installation costs. Other unique characteristics of aluminum pipe are also important: It is nonsparking, safer to use with volatiles. And, the smooth inside surface of Reynolds Aluminum Pipe means less danger of scale formation—you get improved product flow that can hold pumping costs down.

AVAILABILITY

Reynolds Aluminum Process Pipe is available in schedules 5, 10, 40 and 80. Diameters range from 1/8" to 12", and thicknesses range from .065" to .200". In addition, Reynolds Aluminum Pipe is available in both Duplex and Heavy-End types.



Reynolds Aluminum Heavy-End Pipe

HEAVY-END PIPE

Reynolds Aluminum Heavy-End Pipe can save up to 28% in piping costs. Heavy-End Pipe, with a constant inside diameter, is thicker at the ends to compensate for the loss in mechanical properties due to welding or grooving. Excess metal is eliminated in the pipe body and extra strength is provided where it's needed most—at the joint. It enables you to design a uniformly strong system without paying for extra metal, without overdesigning. Heavy-End Pipe is available in schedule 40 and 80 equivalents, and takes standard fittings.

REYNOLDS DUPLEX PIPE

Reynolds Duplex Pipe is actually a two-pipe steam trace system in one. A dividing wall inside the tube provides two separate channels—one for steam or condensate, the other for the viscuous product. Duplex eliminates an outside steam line and the cost of fastening the two pipes together, and it minimizes insulation needs.

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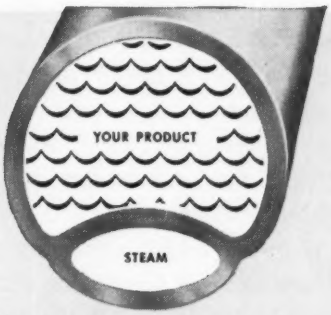
When designing any process system, plan for economy and long, efficient service; plan with Reynolds Aluminum Process Pipe. For details, contact your local Reynolds office, or write for complete file on the uses of aluminum in the chemical process industry. Use coupon below.



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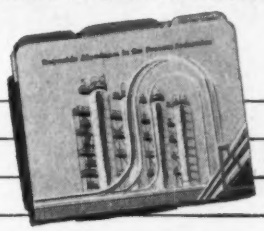

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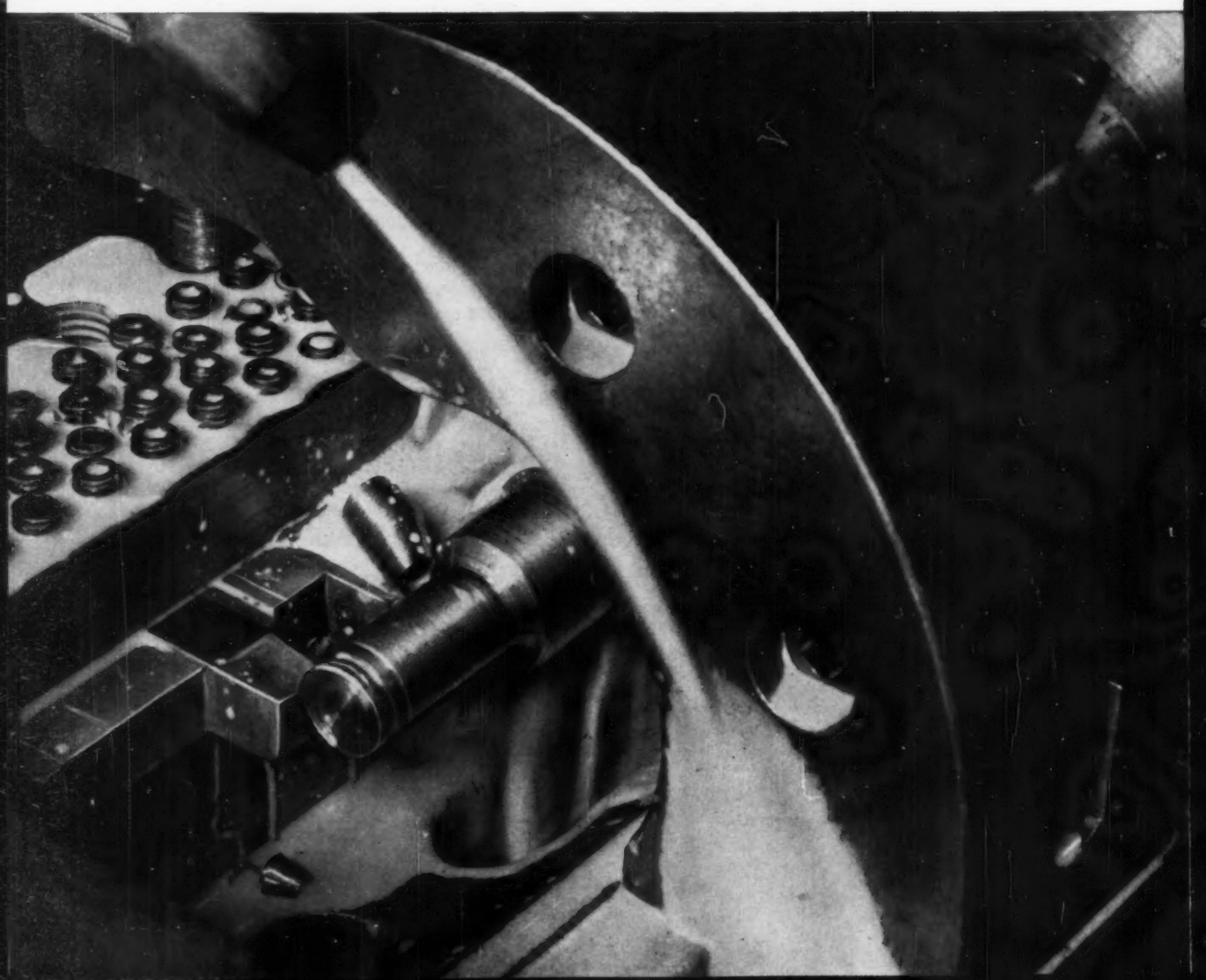

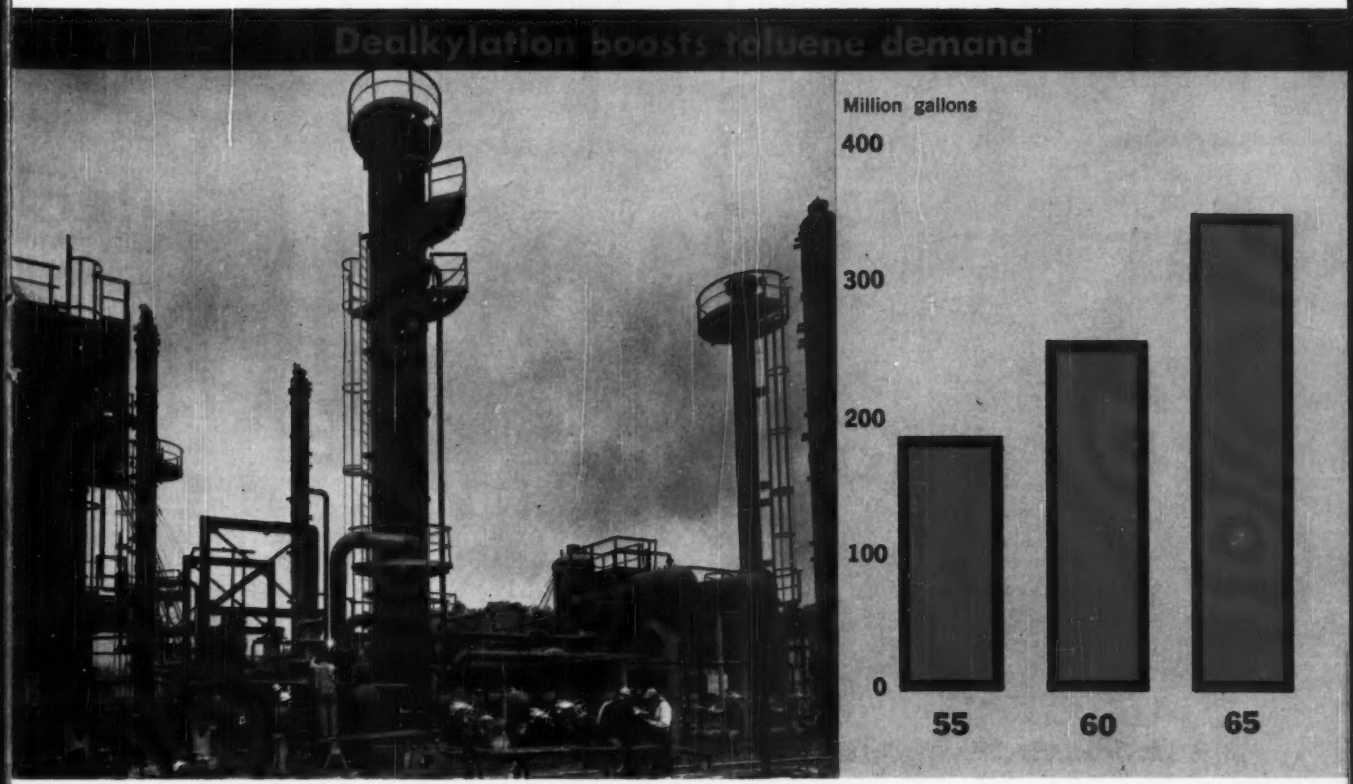

Ashland Oil's new Hydeal plant goes up at Catlettsburg, Ky.

Benzene Brightens Toluene Horizon

Toluene, once regarded primarily as an octane improver for gasoline, is today rapidly acquiring new stature in chemical processing. Key to its new role: the Hydeal process for making benzene. Eight new benzene-from-toluene plants going onstream either this year or next will consume 120 million gal./year of toluene when operating at capacity. Result: a temporary tightness of supply during '61.

Total domestic market for toluene today is about 195 million gal., 20 million gal. more than in '55. During the next five years consumption will likely rise an additional 110 million gal. as nongasoline uses grow.

Nongasoline uses made up only 30-35% of the total consumption in the U.S. between '55 and '60. But new processes utilizing toluene as the raw material will rocket consumption for these uses from 66 million gal. now to more than 200 million gal./-year by '65—65% of total demand.

The Hydeal process—hydrodealkylation of toluene to benzene—will have the most important immediate effect on toluene's market future. This process, designed jointly by Universal Oil Products Co. (licensee) and Ashland Oil & Refining Co., is steadily gaining popularity in the U.S. Already, the lineup of companies building Hydeal benzene plants or reportedly planning to do so in the near future—with combined capacity of 97 million gal./year—includes:

- South Hampton Co., which recently put the first Hydeal unit in the U.S. onstream at Silsbee, Tex. Rated capacity: 5 million gal./year.
- Signal Oil, which by the end of this month will be onstream with a 17-million-gal./year plant at Houston, Tex.
- Suntide Refining, scheduling its 6-million-gal./year unit for completion in early '61 at Corpus Christi, Tex.
- DX Sunray, now constructing a 5-million-gal./year unit at Tulsa Okla. Onstream date: early '61.
- Plymouth Oil Co., planning to have its 15-million-gal./year plant at Texas City, Tex., completed by '61.
- Ashland Oil & Refining Co., which has two projects in the works—a 12-million-gal./year plant at Catlettsburg, Ky., and a 7-million-gal./year unit at North Tonawanda, N.Y. Both facilities will be onstream during '61.
- Dow Chemical, reportedly planning to build the largest—30 million gal./year—Hydeal plant in the country at Freeport, Tex. (*CW Market Newsletter, Nov. 12*).

In addition, other companies admit they are interested in the Hydeal process, may decide to jump on the band wagon in the near future.

Although Dow will not confirm reports of its entry, industry sources point out that the company not only

Hydeal Benzene Units

		Capacity (million gallons)	Status
Ashland Oil & Refining	Cattletsburg, Ky.	12	early '61
	North Tonawanda, N. Y.	7	'61
Dow Chemical	Freeport, Tex.	30	late '61 or '62
Plymouth Oil	Texas City, Tex.	15	'61
Signal Oil	Houston, Tex.	17	Dec. '60
South Hampton	Silsbee, Tex.	5	onstream
Sunray	Tulsa, Okla.	5	'61
Suntide Refining	Corpus Cristi, Tex.	6	'61
		total 97	

has already cleared the site for this plant but also has negotiated with nearby refineries for the required toluene. In recent years, Dow has imported more than 30 million gal./year of benzene. Most of it has come from Russia and its satellites on contracts expiring by the end of this year—contracts Dow is not expected to renew. In fact the Russians are reported to be in no hurry to renegotiate benzene contracts at favorable prices. Therefore, building a Hydeal benzene unit at Freeport would be a logical move for Dow.

Phenol—Potential End-Use: Phenol production also might very well become an important end-use for toluene. Recently, Dow Chemical and California Research cooperated to develop a process for phenol via toluene. Dow is constructing a 36-million-lbs./year plant in Kalama, Wash., employing this process. This unit, which should be onstream by late '61, would consume over 5 million gal. of toluene annually when operating at capacity. It's too early to tell whether this new process will gain widespread use in the industry, but it represents another technological advance that increases the future importance of toluene.

Other Chemical Uses: Other chemical uses for toluene are benzaldehyde, benzoic acid, benzyl chloride and the toluidines.

These chemicals find major uses as intermediates for other chemicals—e.g., benzyl chloride is used to make benzylamines, benzyl cyanide, benzyl alcohol, and many others. Benzoic acid is a precursor for benzoates and benzoyl compounds as well as a preservative for foods.

These chemical end-uses took about 25 million gal. of toluene during '55 and consumption in '60 is expected to be 30 million gal. This market will likely continue to show a slow growth pattern during the next five years.

Plastics: Toluene is used also in the manufacture of vinyl toluene (methyl styrene) and toluene diisocyanates which are used in polyurethane manufacture.

Vinyl toluene, which replaces styrene in many uses, including synthetic rubber, has never had significant market success, and little change in this situation is expected.

Polyurethanes, on the other hand, have had an outstanding growth record, especially during the past few years.

It has been estimated that urethane consumption in the U.S. will reach 100 million lbs. by the end of this year and 300-350 million lbs. by '65 (*CW, Nov. 12, p. 113*). Toluene consumption in plastics has grown accordingly: 0.5 million gal. in '55, 3.5 million in '60, and an estimated 10 million gal. by '65.

In explosives, toluene is the raw material for trinitrotoluene (TNT) production. Almost all — more than 95%—of the TNT manufactured in the U.S. goes into military applications. And since more powerful explosives and propellants have been replacing TNT in munitions, toluene's use in explosives will likely drop—from 8 million gal. now to 6 million gal./year by '65.

Toluene has powerful solvency properties, is used widely in the manufacture of various protective coatings, lacquers, synthetic enamels, roller coatings, etc., and as a vehicle in many insecticides.

Although latex paints have made inroads into this market, toluene still has a slow consumption growth as a solvent. During the next five years this growth will continue if its price remains at the present level. Accordingly, by '65 its consumption in the U.S. as a solvent will reach 35 million gal.

What About Gasoline? Toluene's future in gasoline is probably the most difficult category to interpret. It's use here—it is added to gasoline to improve octane rating—is dependent upon price, availability of other blending components of the basic blending stocks.

The most obvious factor is the decline of aviation gasoline consumption in the U.S. during the past few years and the probable continuation of this trend. Jet-powered engines are rapidly replacing the piston variety in both military and civilian aircraft. Industry experts point out that in '59

Toluene End-Uses

	million gallons		
	'55	'60	'65
Gasoline:			
Aviation gas	54	38	—
Motor gas	70	90	—
Total gas use	**124**	**128**	**100**
Non-gas uses			
Solvents	20	30	35
Chemicals	20	25	155
Explosives	10	8	6
Plastics	0.5	3.5	10
Total non-gas	**50.5**	**66.5**	**206**
Exports	**11**	**60**	**40**
Grand total	185.5	254.5	346

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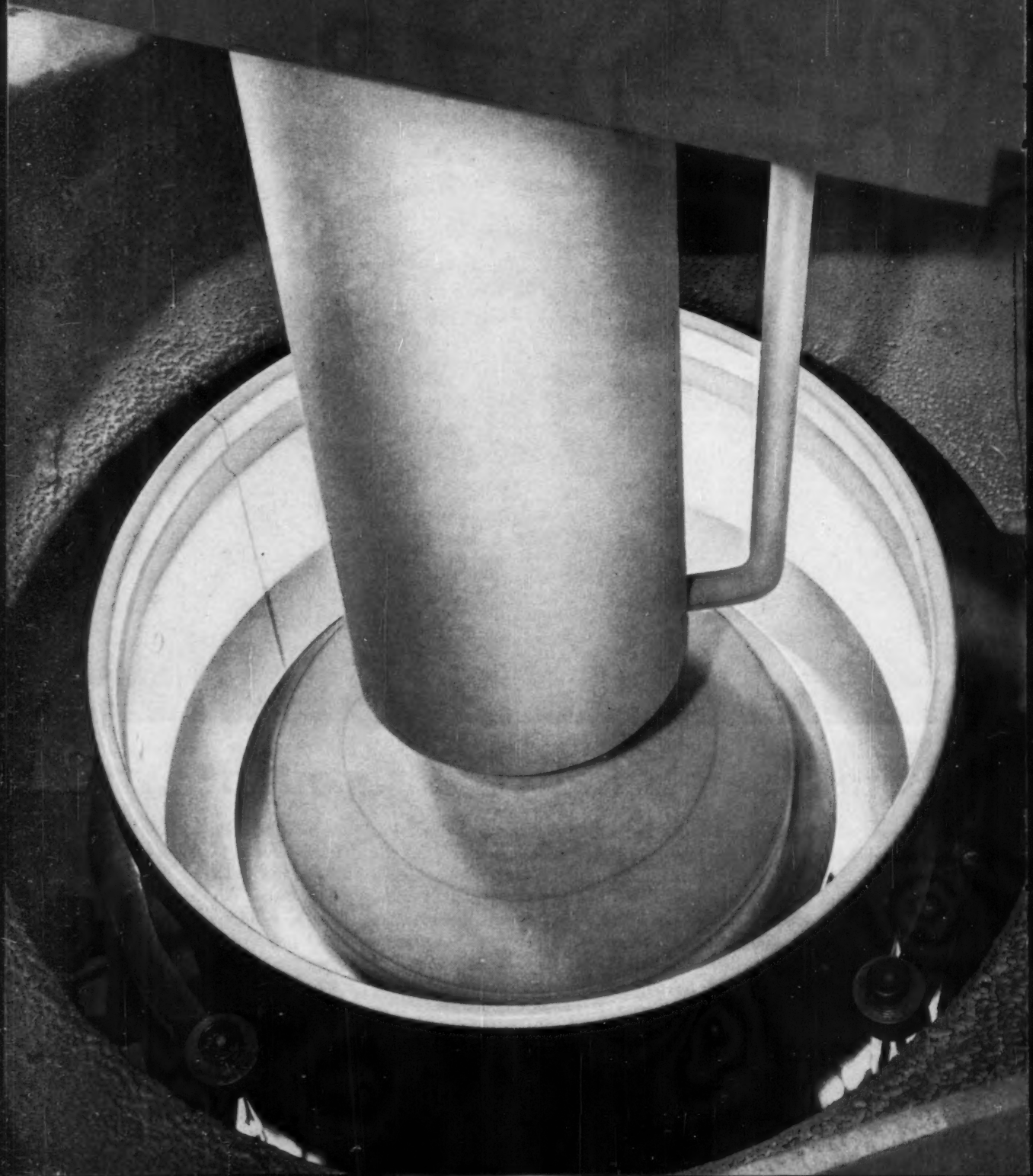

...new process now makes pail linings completely dependable

Overhead view on the opposite page shows a protective coating being applied to the interior of a five-gallon pail by the new, Rheem Centrifugal Lining Method.

Developed solely for lining cylindrical container interiors, the Rheem Centrifugal Lining method is the first pail-lining process that is not merely an adaptation of painting equipment. In this exclusive process the fine lining particles pass from the circumference of the rapidly spinning applicator head to the container body by centrifugal force.

Unlike ordinary methods, air pressure is not needed to carry the lining particles. Solvents are therefore reduced; air turbulence is eliminated; the grease and grit of compressed air lines are avoided.

This means that foreign particles are not trapped under the lining to emerge as pinholes and blisters in the lining after the curing process. The filled product can't react with the steel to form contamination, nor will the lining flake off into the product. Because air turbulence is eliminated, a uniform thickness is deposited on the entire pail surface.

Lining is applied as the pail is automatically raised and lowered past the spinning applicator head. The space from the edge of the head to the wall of every pail is always the same. The angle of application is constant.

Result: lining thickness is controlled to fractions of a mil even in such difficult areas as the bottom crevice and beads. One gallon of filled product gets the same uniform protection as the next.

The Centrifugal Process, being automatic, eliminates the chance of operator fatigue or inattention and resultant skips in the film.

The Rheem Centrifugal Pail Lining process is based on the Rheem technique for lining drums—a technique proved superior in more than three years of use.

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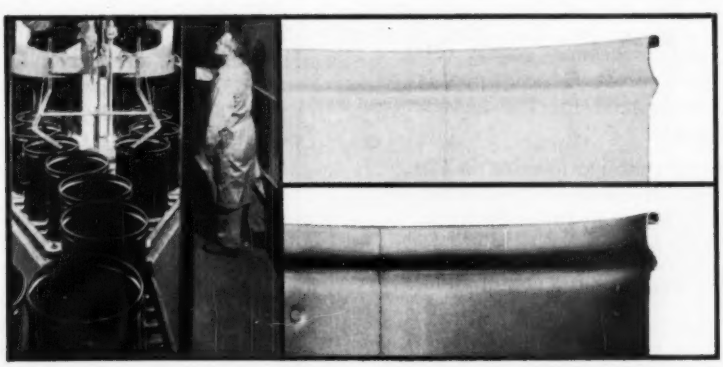

Pail shells (left) move up to Centrifugal Lining equipment. Positioning arms clamp pail, raise it past spinning applicator head. Angle, distance and speed never vary.

Result: Centrifugal-Lined pail (top) shows uniform coverage that provides dependable protection. Compare it with conventionally lined pail (bottom). Uneven coverage on seam, thin (dark) spot in bead may lead to product contamination.

WORLD'S LARGEST MANUFACTURER OF STEEL SHIPPING CONTAINERS

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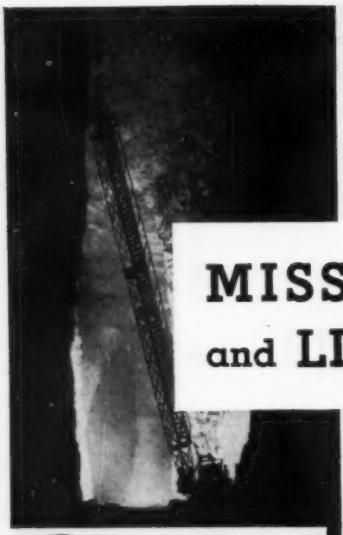

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approximately 225,000 bbls. of aviation gasoline were used daily in the U.S. They estimate that by '64 this consumption will drop to 150,000 bbls./day, a drop of about 30%.

The market for toluene in automobile gasoline also appears to be heading for a decline. The race for higher-octane gasoline appears to be over, and future use of toluene as an octane improver will likely correspond to the demand for premium gasolines.

One factor is the popularity of compact cars. American Motors' president, George Romney, estimates that 50% of the '61 models will be compacts. These cars not only will burn less gasoline per mile but also, because of their low compression ratios, will not require higher-octane or premium gasolines.

Moreover, oil companies are moving fast in developing octane improvers that are more economical than toluene.

The sum of these factors point to a decreased use of toluene in the years ahead. By '65 toluene consumption in gasoline—automotive and aviation—may drop 25 million gal. from 128 million gal. used now.

Supply and Demand: In analyzing the over-all toluene market, Ralph Landau, executive vice-president of Scientific Design Co., points out that approximately 3.5 billion gal. of toluene are potentially available out of refinery streams each year. This, of course, is more than demand would conceivably be in the years ahead. Actually, toluene capacity from petroleum totals less than 330 million gal./year. In addition, capacity from coke ovens and light-oil distillers is approximately 50 million gal.

Total U.S. demand, plus exports, by '65 would be about 350 million gal.—30 million gal. less than existing domestic capacity. Consequently, a temporary tightness of supply, according to industry sources, is already starting to take place—with the resultant firmness in price. After the first of next year, toluene will be sold for 25¢/gal. f.o.b., freight equalized, rather than the present basis of 25¢/gal., delivered. This tightness of supply will be only temporary. Oil companies, responding to this expected situation, are building adequate Udex toluene capacity to stave off any long-range short supply.

All told, toluene is at last finding a

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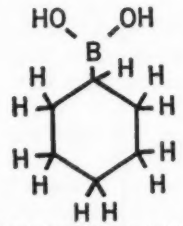
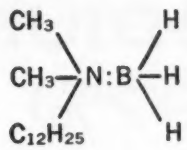
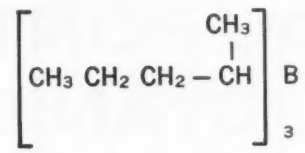


Cyclohexyl Boric Acid



Dimethyldodecylamine-Borane



Tri-Sec-amylborane

PHYSICAL PROPERTIES

	Cyclohexyl Boric Acid	Dimethyldodecyl-amine-Borane	Tri-Sec-amylborane
Mole Wt.	128	227	224
Form	Powder	Liquid	Liquid
Density	—	25°c 0.802 g/ml	20°c 0.790
Refractive Index	—	n_0^{25} 1.4500	n_0^{20} 1.4455
M P.	50°C	7—8°C	—
Spontaneous Ignition Temp.	—	—	297°F

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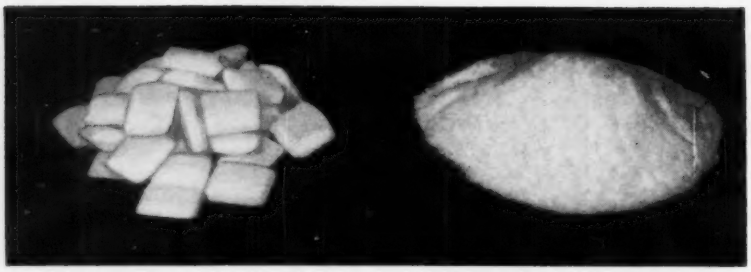

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	Specification	Typical Analysis
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Sodium hydroxide	—	0.46%
Sodium carbonate	—	1.14%
Sodium formate	—	0.21%
Sodium chloride	0.2% max.	0.03%
Water	—	0.03%
Sulfides (as sulfur)	0.0005% max.	0.0003% (3 ppm)

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niche as an important chemical intermediate. The consequence is a temporary short supply situation, which could exert an upward pressure on prices. A price rise in '61 could impair market growth, in fact might stunt toluene's growth in three of its major end-uses: benzene manufacture by Hydeal, solvent applications and its use in gasoline as an octane improver. If the price spread of benzene and toluene substantially decreases, the Hydeal process could become uneconomical.

Moreover, a toluene price increase would allow other aromatic solvents, such as xylene, to carve away some of the solvents market, and oil companies are getting into position to obtain high-octane gasoline by means other than addition of toluene.

In brief, the long-range future pricing decisions of toluene producers will determine whether toluene will enjoy new and important growth.

MARKETPLACE

Four n-alkyl bromides have been added to the list of semicommercial products offered by Michigan Chemical Corp. These new additions, cetyl bromide, hexyl bromide, myristyl bromide and stearyl bromide, supplement Michigan's list of already available bromides.

The company says these long-chain alkyl bromides can be used to impart germicidal or algicidal activity to quaternary derivatives.

•

A tetrapotassium pyrophosphate plant has been put onstream at Jeffersonville, Ind., by Hooker Chemical, part of the company's diversification program. The compound, commonly called TKPP, is a key chemical in the manufacture of heavy-duty liquid detergents for household use. Because it is more soluble than sodium phosphates, TKPP is also expected to find some applications in the industrial all-purpose cleaner field where sodium phosphates are now being used extensively. Hooker says its TKPP, in granular form, also has useful sequestering power.

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Two new mineral studies were recently made available by Resources for the Future, Inc. (Washington, D.C.): Historical Statistics of Minerals

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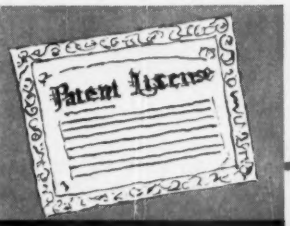

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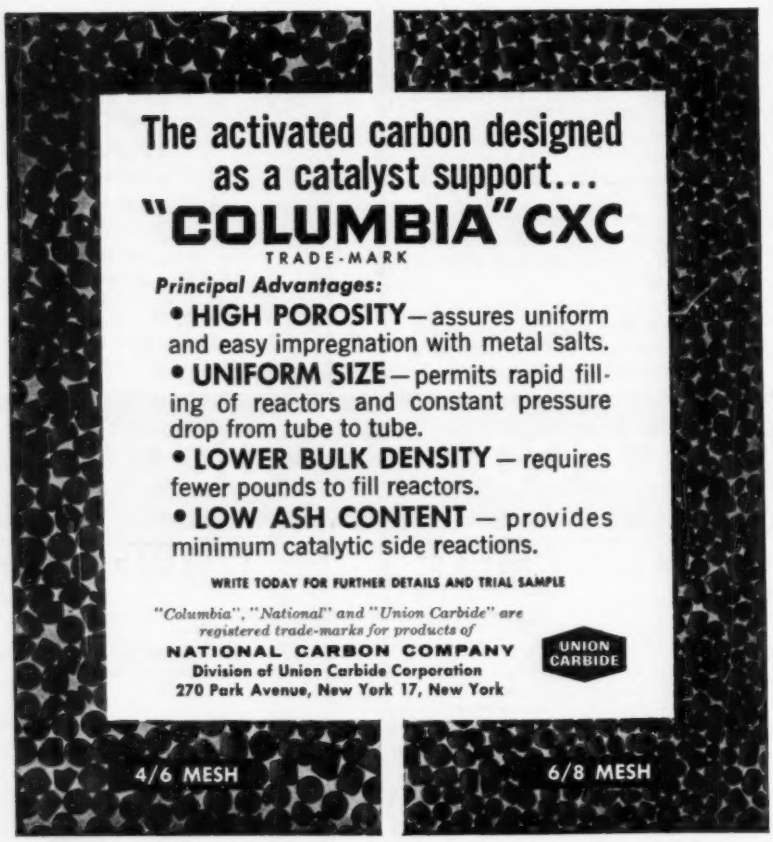

in the United States, and Exploration for Nonferrous Metals: An Economic Analysis.

•

A $1.3-million expansion and modernization program has been completed at Western Petrochemical Corp.'s Chanute, Kan., refinery. The expansion program included installation of new propane deasphalting facilities, additional vacuum distillation units, and a Thermo for Continuous Percolation bleaching unit, one of the first installations of its kind for wax production. Output of the refinery has been doubled.

•

Building products led all other end-uses as a consumer for semifabricated aluminum commodities in the second quarter of '60, according to new figures from the Aluminum Assn. Shipments increased 5.2% over the first three months of the year, totaled 23.8%.

This outlet, plus the distributor and jobber markets, were the only two that showed substantial gains over the first-quarter shipments. The distributor-jobber share of this market increased from 14.1% in the first quarter to 16.4% in the second quarter.

The next-largest consuming outlets —transportation and consumer durable goods—were off, while electrical outlets were up slightly. Transportation field (covers all vehicles including pleasure boats and motors) dropped from 18% to 14.5%.

•

Lethane has been cleared as toxicant for cattle sprays. The U.S. Dept. of Agriculture has accepted the extensive data of Rohm & Haas that Lethane thiocyanate may be used safely for the control of such insects as hornflies, mosquitoes and gnats on dairy cattle. Lethane will be added to the USDA "Summary of Certain Pesticides Chemical Uses" on a no-residue basis.

•

Tire manufacturers are headed for a big year, says the Rubber Manufacturers Assn. The automotive tire market is primarily responsible. Auto tire output (original equipment and replacement) increased 5.5 million units in the first nine months of this year over the same period in '59. At the same time, inventory levels were decreased over 3 million units.

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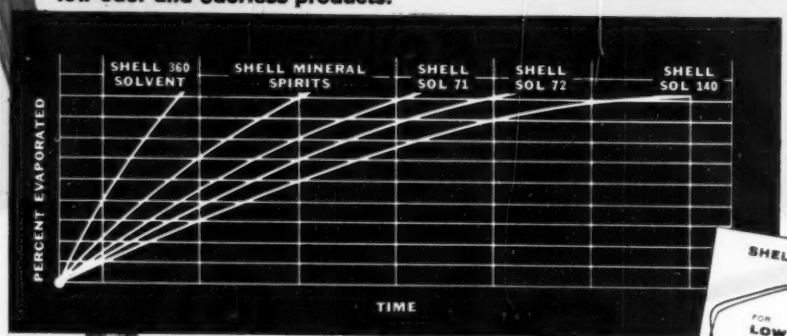
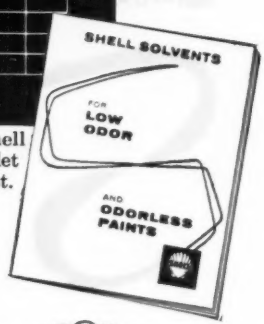


Typical properties of these Shell Solvents are contained in booklet shown. It will be mailed on request.



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SHELL

Market Newsletter

CHEMICAL WEEK
November 26, 1960

Lower prices swept the chemical industry this week. Heading the list is polyisoprene ("synthetic natural" rubber), price of which was slashed 5¢/lb. by Shell Chemical—from 32¢/lb., to 27¢/lb., f.o.b. Torrance, Calif. On a delivered basis, quotes are 28.1¢/ for c.l., 28.7¢/lb. for l.c.l.

Behind the cuts: increased competition stemming from the decline of natural rubber prices during the past two months (now around 30½¢/lb., f.o.b. New York).

•

The economic relationship between natural and synthetic-natural rubber was highlighted at last week's 45th annual meeting of the Rubber Manufacturers Assn. in New York. Ray P. Dinsmore, vice-president of research and development for Goodyear Tire & Rubber Co., says it is no longer a question of whether the synthetic-naturals can replace natural rubber, but one of economics. During the next few years, he pointed out, the new rubbers will be competing with natural rubber in a world market that may stabilize at 25¢/lb., or less—perhaps 18-20¢/lb. For the synthetic-naturals to be competitive at this range, says Dinsmore, it will be necessary for chemical makers to develop inexpensive starting materials and economical processing methods.

•

The Soviet bloc will play a big part in rubber's economic picture in the next few years. If Communist-country purchases continue at near their present level (192,000 tons during the first eight months of '60), stero rubber will be needed to keep natural rubber's position in balance.

•

Posted prices for some polyvinyl chloride resins were quietly toppled last week as Monsanto Chemical Co. notified its customers of lower prices.

Under the new schedule all straight polyvinyl chloride resins (homopolymers) were cut 2¢/lb. across the board. Polyvinyl chloride compounds were also affected, on reductions of ¾¢/lb. across the board.

The new quotes are not entirely unanticipated. Intensive competition in the field has forced producers to maintain business by price concessions, which had whittled the selling price well below posted quotes. Other producers in the industry indicate they will follow, thus making the new tabs industry-wide.

•

Lower prices for styrene-butadiene latex have been adopted. Major producers indicate they will follow the 2¢/lb. across-the-board reductions posted last week on all but a few styrene-butadiene latex products (*CW Market Newsletter, Nov. 19*). New quotes in tank-car quantities: 27.5¢/lb.

Higher toluene prices are meeting with mixed reactions from the petroleum industry. Shell initiated the change last week, when it switched from a delivered basis to f.o.b. terminal and refinery points. While the industry is receptive to such an increase, not all producers have joined in, prefer to wait and study the situation; under most contracts they have until Dec. 1 to decide whether to boost prices. Several producers have gone along with the new schedule.

In effect, the change will shift freight charges to the consumer, thus reduce selling costs; technically, it means a price increase. Reason for the move: a growing scarcity of toluene (*see p. 89*).

•

Supplies of muriate of potash from France and Spain will be scarcer during the '60-'61 fertilizer season.

A 30-day slowdown in potash production from the French mines in the Mulhouse, Alsace, region will cut supplies by about 60-80,000 metric tons. Meanwhile, an accident in October in the main shaft of the largest potash mine in Spain (at Cardona) will affect production for about five months. Output losses will be about 20-25,000 metric tons.

The entire loss will affect supplies in both the U.S. and world markets. Earlier this year sulfate of potash supplies became short due to growing worldwide demands (*CW, Oct. 15, p. 89*).

What effect will this have on the U.S. market? According to G. D. Glover, president of French Potash & Import Co. Inc. (sole importer for both Spanish and French potash), U.S. buyers will be cut back about 8% on their requirements.

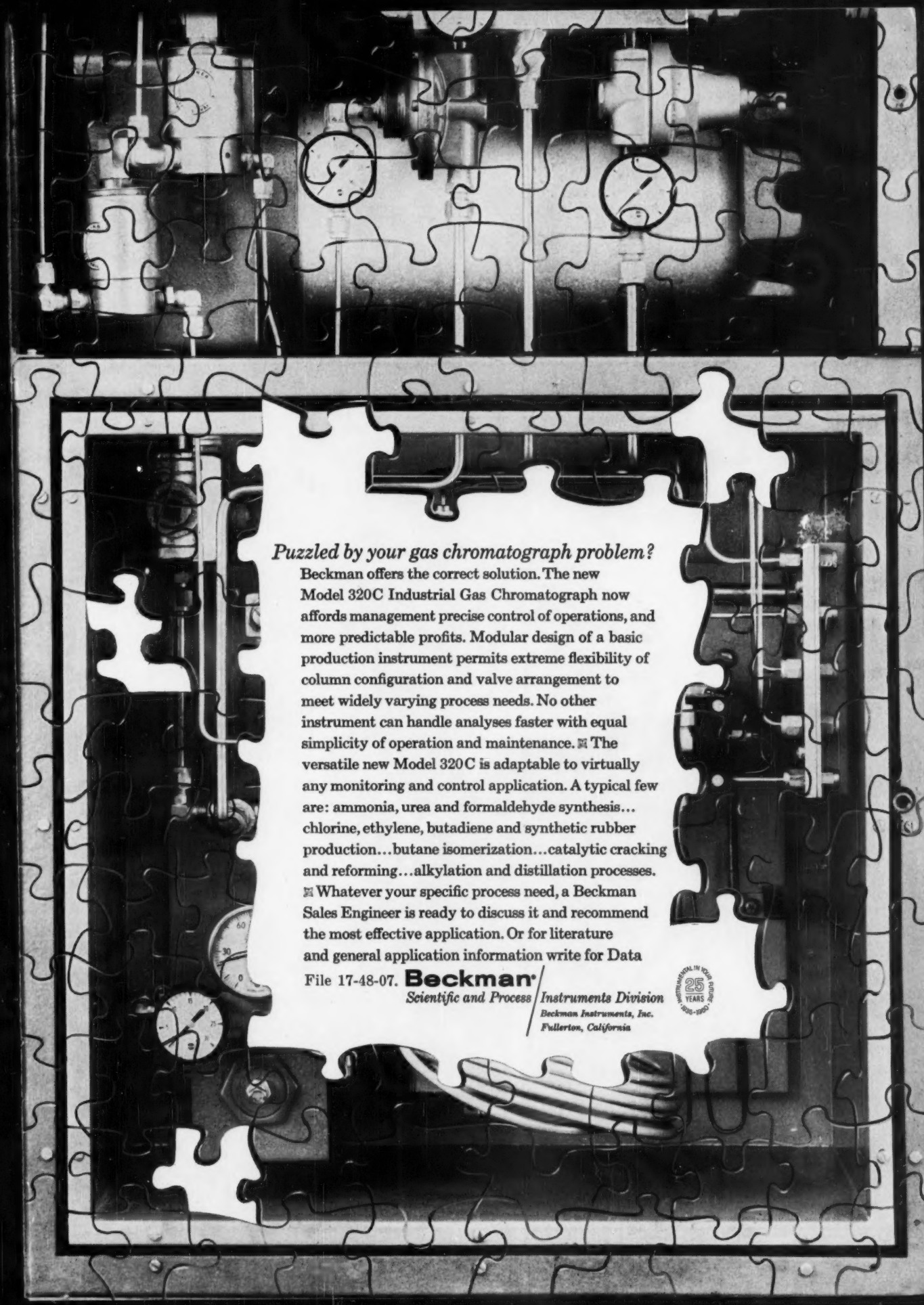
•

Output of French chemicals continued their rapid climb during the first nine months of this year, topping the record levels set in '59. There were increases in both inorganic and organic chemicals.

Biggest gains were made by sulfuric acid, with production during the first nine months a solid 101,000 metric tons higher than the 1.4 million metric tons turned out during the same period in '59. Other output gains for major inorganic chemicals in the first three quarters, compared with the same period last year: soda ash, 627,400 tons vs. 557,000 tons; primary nitrogen, 524,850 tons vs. 484,800 tons; calcium carbide, 335,000 tons vs. 266,500 tons; chlorine, 241,700 tons vs. 200,000 tons.

In the organic sector, methanol is the big gainer, moving up almost 66% to 49,900 metric tons, vs. 30,400 tons in the first nine months of '59.

Gains of other principal organic chemicals in the same period: acetone, 35,640 metric tons vs. 29,500 tons; synthetic phenol, 39,250 tons vs. 29,700 tons; phthalic anhydride, 21,850 tons vs. 19,000 tons.



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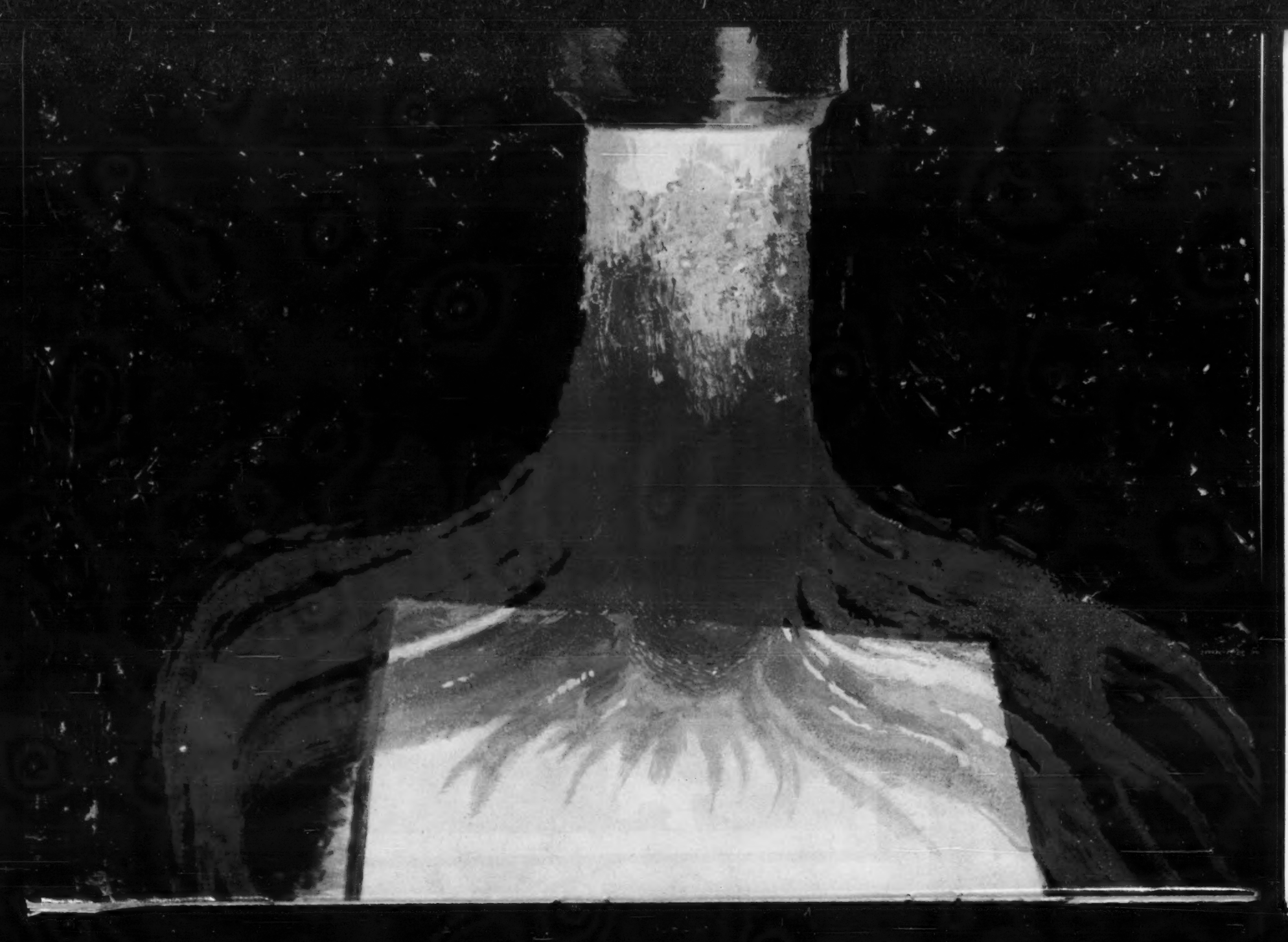

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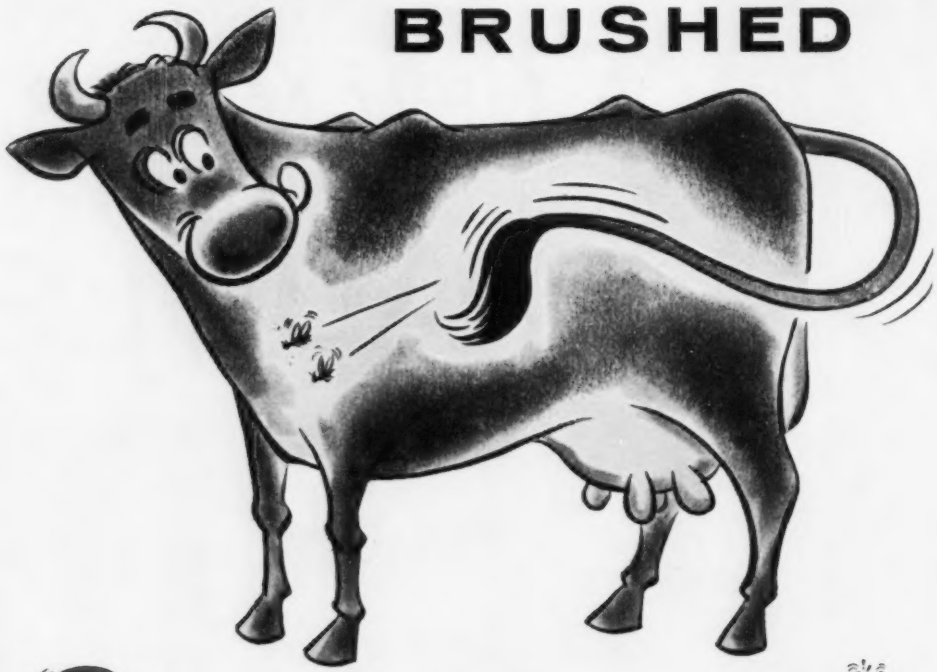

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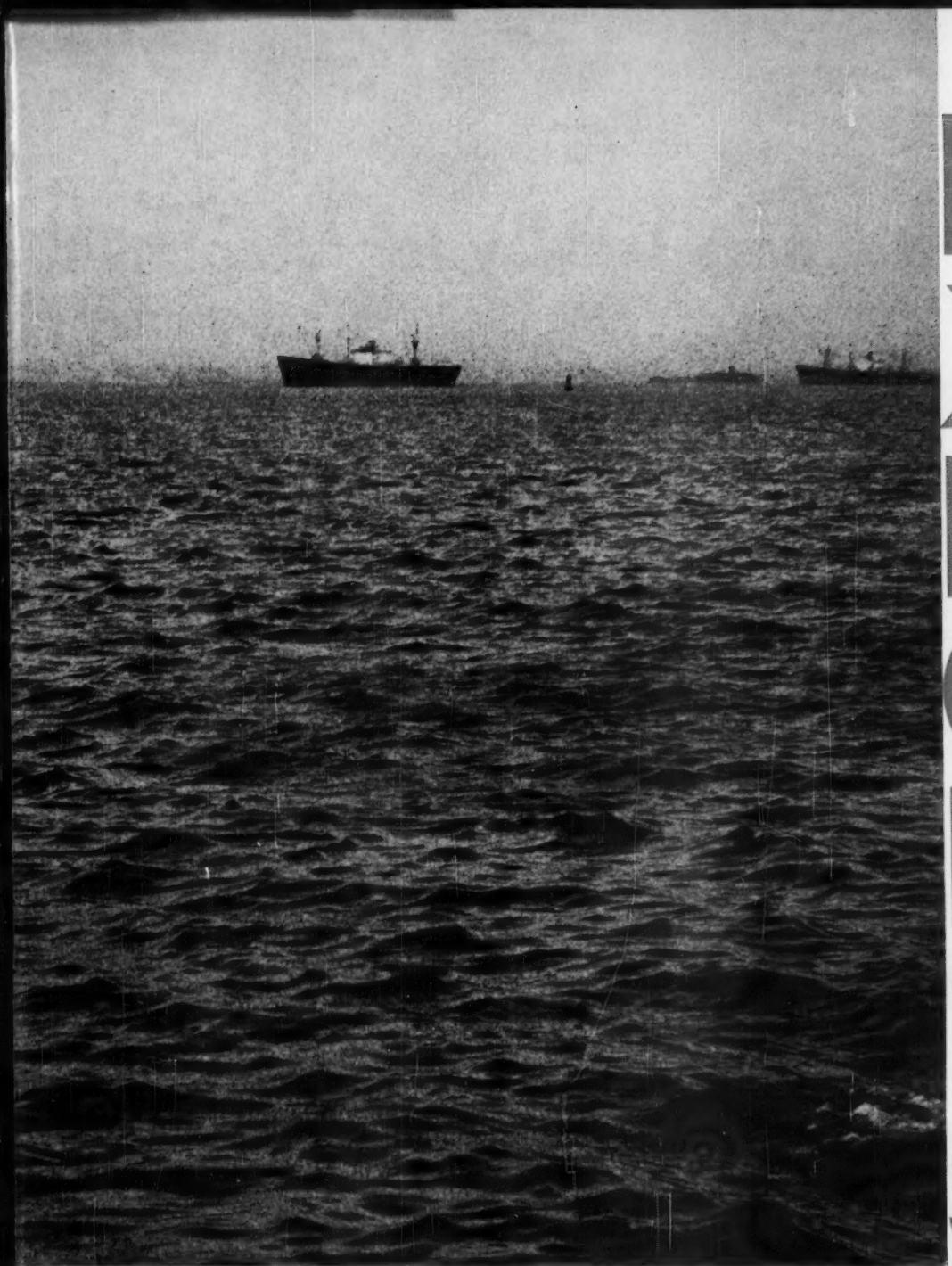
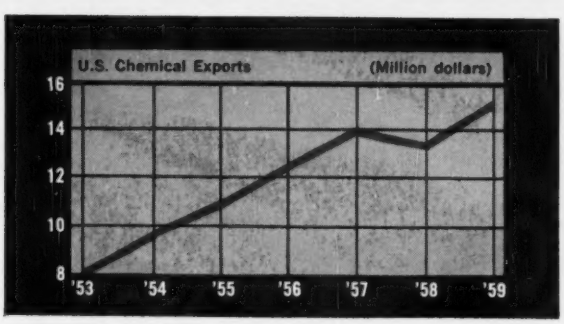


EXPORTS



IT'S TIME TO PUSH

U.S. chemical producers have enjoyed a sellers' market abroad. But competition is getting tougher, and they'll have to push harder than ever to keep the export curve rising.

SPECIAL REPORT

SPECIAL REPORT

No more leeway for 'stepchild'

THANKS TO booming business and unstocked storage bins overseas, as well as reduced restrictions against dollar area goods, U.S. chemical producers will rack up spectacular export totals again this year.

They can credit their own sales efforts with some of this gain, of course. But, like other U.S. manufacturers, most chemical companies are bad salesmen when it comes to exports. And if they don't improve, they can expect their score to start slumping as the competitive odds start stacking up against them.

This is the consensus of industry men and traders surveyed by CHEMICAL WEEK correspondents around the world. It's backed up by executives in the U.S. and by worried government officials.

Signs of Slippage: Right now, total U.S. chemical exports are still the most massive in the world. But they may not enjoy this status much longer.

The world market has entered a new phase of its postwar evolution. The period of rebuilding, during which U.S. producers had easy selling, has come to an end.

Europe and Japan's chemical industries have not only regained, but far exceeded, their former stature—they can largely supply their home markets, reentrench themselves in Africa and Asia, muscle in on U.S. exporters' "home territory" in Latin America.

The new European trading blocs will shut out many of the chemicals this country now sends to their members. And in the growing markets of the developing nations, trade barriers are raised to protect them.

Meeting the Challenge: The world, in short, is becoming a bigger marketplace and a tougher one. There is plenty of evidence that the U.S. chemical industry, which prides itself on its technological leadership, is not keeping pace with the commercial realities of this new world.

Many industry men will deny this. Over the last few years their favored theme has been that the chemical industry has "gone international." Companies that have had little interest in overseas business, or have kept quiet about it, suddenly issue annual reports proclaiming far-flung operations. Some are even consolidating their foreign earnings.

Surely, there's no denying the dramatic awakening of the U.S. chemical industry to overseas opportunities, signified by its mounting plans for foreign capital expenditures. All the major companies, and many of the smaller ones, have decided to increase their overseas manufacturing stake.

But, many observers say, building abroad isn't enough, if U.S. companies want to take full advantage of the opportunities of the building world. For many products in many markets, the only practical way to sell is through exports.

And for all their talk about their new international outlook, few U.S. companies abroad display the salesmanship that helped prime the U.S. market. Ignorance of local markets, indifference to opportunities, bad service—these are the terms in which foreigners most frequently describe U.S. sales efforts in their countries.

Government Push: The U.S. government doesn't share this blasé attitude about exports. With its burden of overseas military and economic obligations, with foreign investment and tourist expenditures mounting, the U.S., for over a decade, has been running a deficit in its balance of international payments.

In the past, this has been held to a manageable margin by the export surplus. But with imports rising faster than exports, this surplus has been shrinking alarmingly. Last year, the deficit hit $3.8 billion, while the trade surplus shrank to only $1.1 billion. This year, despite a sizable rise in exports, the deficit may again run up to well over $3 billion.

Most desirable way to correct this situation, the government feels (and the incoming President evidently agrees), is to fatten the trade surplus by $3-4 billion through increasing exports. This goal would have been reached last year if the U.S. had exported about 13% more than it did. For the chemical industry, this means exports should have been $200 million higher than their record level.

The Administration is convinced that U.S. industry can do this. Commerce Dept. officials almost ritualistically remind businessmen that "there are 300,000 manufacturers established in the U.S., and only 12,000 are engaged in exporting their products."

'Operation Hard Sell': Last year, Undersecretary of State Douglas Dillon succeeded in getting most foreign import quotas discriminating against U.S. goods removed, and by the end of this year practically all of them will be gone. It was the single most important step in the government's effort to boost exports. Although it's exact effect is hard to gauge, experts credit it with stimulating a significant part of the export rise in '59 and '60.

To liven U.S. industry's export ambitions and help fulfill them, the Administration launched its National Export Expansion Program last March. Essentially, it's a step-up of the Commerce Dept.'s publicity and foreign trade information service.

No one in the government is quite sure just how much "Operation Hard Sell" is stimulating exports. Commerce Dept. officials believe they are having some success, though foreign service officer admits "it's not documentable."

Commerce Dept. field offices report that interest in exporting is running much higher this year than in '59. "Of course," a government man wryly notes, "whenever we get into a recession, there's a greater interest in finding wider markets through exports—and we are in a recession of sorts now."

There is the feeling in some quarters that the promotion program is a bit overblown. One government man close to chemical industry problems comments: "The trade promotion people don't understand commodity problems. They'll find a market for a chemical somewhere and announce it, but they don't have any idea about competitive conditions."

export selling

No Excitement: Businessmen are less than enthusiastic. "The government doesn't really care about exports," grumbles an international marketing man from a major chemical company. "The only reason it got into this trade program is the adverse balance of payments. All it cares about is export volume, not profits."

"Export by exhortation won't work," is another export man's comment.

Even an international management consultant who helped set up the program is skeptical that it will do much good.

Behind these criticisms is the feeling that the government's policy is one of wishful thinking. It set its export goals by what it thinks the U.S. needs, rather than by what it has solid reason to believe is actually obtainable, the skeptics say. It won't succeed, they go on, because it doesn't get at the real export problem—high labor and shipping costs, discriminatory tariff arrangements, shortages of dollars in many growing markets.

The staggering freight rates on U.S. ships is probably the greatest single problem facing the chemical exporter. The rate per hundredweight of sodium cyanide runs about 85¢ on goods shipped from Europe to New York. Going the other way, the rate runs $5.85-$6.61. Differentials like that can easily wipe out the raw material and production cost advantages U.S. chemical producers often have.

If the government really wants to aid exporters, many industry people say, it should help offset their high costs with a tax incentive—the kind some European countries give their exporting industries.

Credit is becoming increasingly important in international competition, particularly in the poor countries. Chemical industry people differ on how important credit terms are to their winning sales. Some say that the length offered can win or lose a sale. But most agree that the Export-Import Bank's much-heralded program for short-term political risk coverage—put into effect last spring as part of the export expansion program—is inadequate. It's too expensive, many say, and it should cover short-term commercial risks as well.

Again, they point to the low-cost commercial risk coverage offered by several European governments.

EXAMINING THE EFFORT

Government trade people are fully aware of the high cost problems U.S. companies face. But they insist that industry could sell a lot more abroad if it really tried.

"I don't think top-level management is interested in foreign trade at all, because the domestic market is so good," a Commerce official complains. Union Carbide International's credit manager, George Hawkins, summed up the situation in a recent talk: " . . . export sales have reached the importance that they have today because of conditions during times of poor sales in the home market."

Growing Weight of U.S. Chemical Exports

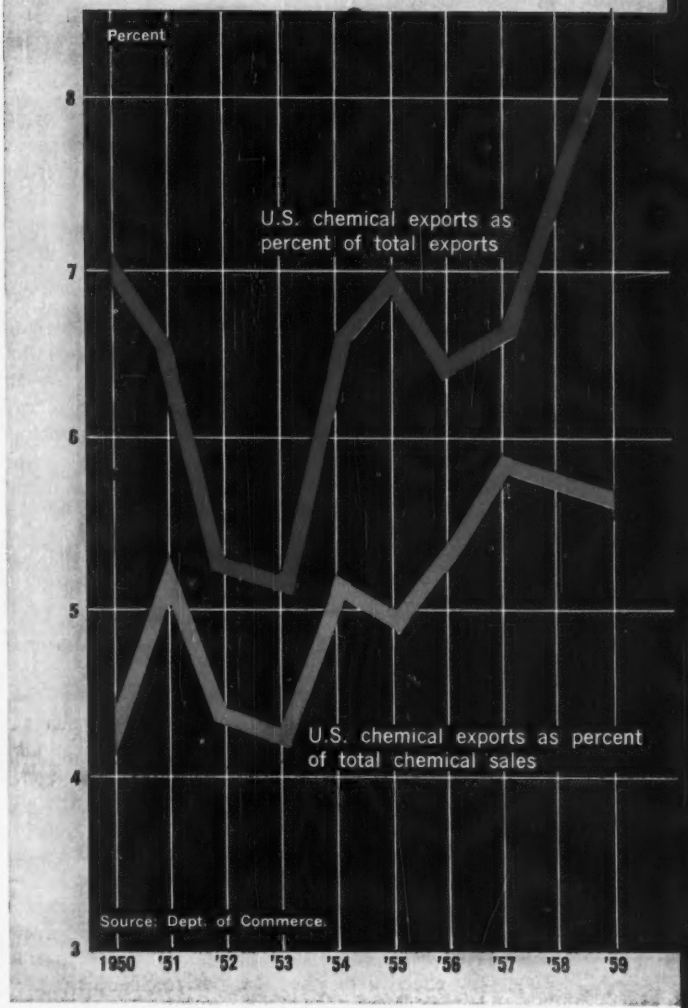


Image of Indifference: This is the same image that U.S. companies have cast overseas. In all parts of the world, the impression is the same: Americans don't care very much about selling their products abroad. The quality of U.S. merchandise is good, frustrated importers often feel, but it's a real job to buy it.

A Rio de Janeiro importer active in the chemical trade for 32 years says: "During the war we had to shift nearly all our business to the States. Now it's been going back to the Europeans. We have been trying to increase one of our U.S. lines, but what happens? We get a letter from the producer saying they'd be glad to grant us exclusivity. But when it gets down to asking details, price quotas, we run into delay. Our letter probably lies around until one day the sales manager says to an assistant, 'Here, Joe, you better write this guy in Brazil and give him a price.' "

CHEMICAL WEEK correspondents have had no trouble finding other examples of U.S. indifference. A few of the complaints: U.S. businessmen don't travel enough, and when they take their once-a-year sales trips, they're usually on schedules so tight that they sometimes leave their distributors and customers (those whom they get to meet at

all) feeling slighted. They have no chance to really know the local market. Few learn the local customs. Few speak foreign languages. Few U.S. companies even bother to reply to a letter from a foreign prospect in his own language—a habit that stands in sharp contrast to the practice of European companies. And they aren't interested in small orders.

A lot of other complaints frequently are voiced. U.S. companies are often too insistent in demanding a letter of credit. U.S. policies requiring quick payment—often for goods that are slow to arrive—force buyers to borrow at very high rates. This indirect cost of buying U.S. goods, says a government official, has the same effect as pricing oneself out of the market.

Another big annoyance is that U.S. companies often quote f.a.s. (free alongside) or ex-plant. Importers would settle for f.o.b. (free on board) prices, but they prefer, and sometimes get from Europeans, c.i.f. (cost insurance freight) prices.

Inadequate foreign sales organizations are common. U.S. companies generally have too few of their own sales and technical men in the field (drug companies are the exception). Often, the sales representatives are ignorant of the local market and conditions. In some markets, such as Rhodesia, big U.S. companies aren't represented at all. And U.S. companies that do have distributors have never, in many cases, had these people meet home office personnel. Moreover, they seldom back distributors with adequate sales and promotion material, and don't always make sure they can handle the company's specialized products.

"Distributors are undersupervised in many companies," an international marketing man observes. "Companies should know how many sales calls a distributor makes a day, how effective they are, how he conducts market studies."

Just how bad this lack of control of the distribution network can get is illustrated in Australia. Years ago, a good deal of Australian purchasing was handled in London offices, or through U.K. merchants. This no longer is the case, but many U.S. firms seem to be unaware of it.

They still grant U.K. firms exclusive distribution rights for what they loosely term "all British countries." These firms are sometimes poorly represented in Australia, and at best they are just an extra middleman, adding to costs and slowing down communications between customers and the U.S. supplier.

Australians also report that some U.S. companies lack a realistic attitude about agencies. A Melbourne sales company, for example, spotted a line of textile specialties and told their U.S. manufacturer that, given time, Australian sales could be brought up to some $250,000/-year. But the producer wanted to see the market developed before granting an exclusive agency. The Australian firm, of course, balked at spending money to promote a product that anybody could buy directly from the producer or from other importers.

Australians find this reluctance to authorize exclusive agencies typical of U.S. companies. They also think U.S. firms make a mistake by generally granting agencies only to big firms, which are already handling other lines. European producers, in contrast, choose relatively small but aggressive companies.

U.S. chemical companies' promotion efforts overseas are in sharp contrast to their U.S. programs. There is a dearth of technical literature translated into foreign languages. U.S. companies have been discouraged by the lack of useful local trade and technical publications, rely on reaching the foreign audience through U.S. publications. But they haven't taken full advantage of the foreign publications that do exist, or of the local press.

"European magazines are hungry for stories on U.S. industry," John Youngman, of Alec Jordan Associates, reports. This technical public relations firm has recently set up an international subsidiary. "I don't think I've sent anything overseas that hasn't been put in," he adds.

"It's a mistake to rely on distributors for promotion, Youngman goes on. They are middlemen, and PR isn't traditionally one of their marketing tools."

Direct publicity activities have been slighted. One major U.S. producer, for example, sends out its international technical publication to about 15,000 readers. It publishes this four times a year ("unless there's something more important to do"). The magazine is a step forward, but its effect is limited by the fact that it contains a hodgepodge of subject matter of concern to customers in widely different markets, is printed only in English, Spanish, and French. German readers read the English edition—if they can read English.

Fatal Flaw: But most damaging of all to U.S. export efforts are the market allocation methods of most companies. Like the rest of our export effort, this reflects the fact that U.S. companies are domestically oriented and not geared for international trade.

Since domestic sales interests are dominant, material for export is often set aside only after domestic sales needs are filled. This results in irregular supplies, and the widespread belief overseas that U.S. suppliers are not dependable.

Worse, in the eyes of foreigners: U.S. companies not only think of the foreign market as a secondary outlet; they also consider it a dumping ground for surplus products, a means to protect the domestic price structure, at the expense of the price structure overseas (*table, p. 124*).

CHANGING ATTITUDES?

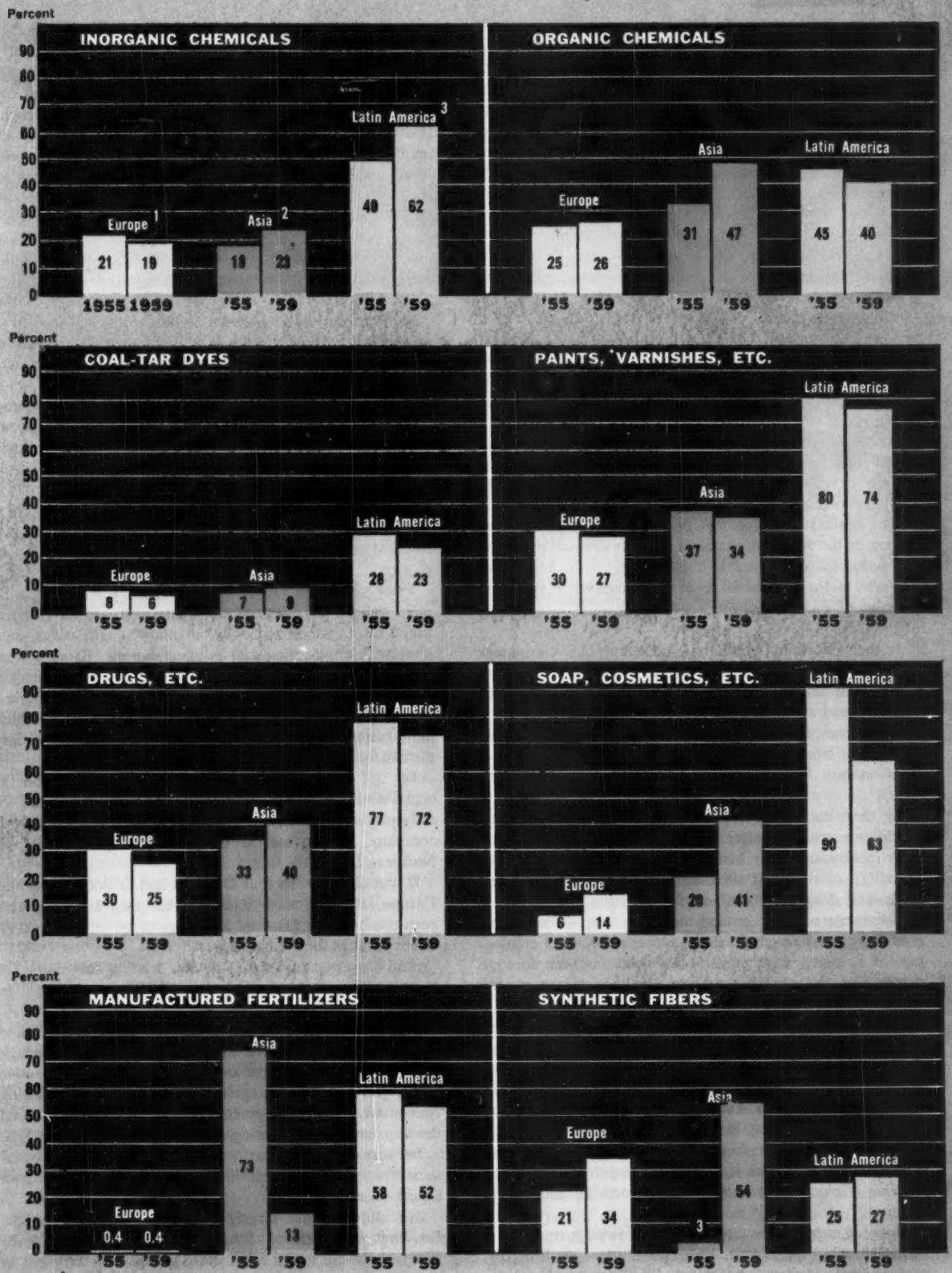
Although they still seem to be largely out of sight from across the sea, there are signs that the U.S. chemical industry's traditional offhand attitude toward exports is changing. Several of the U.S. companies interviewed by CHEMICAL WEEK think that use of foreign markets simply to tap off temporary surpluses, or to make quick profit killings, is fast disappearing.

Executives in the international divisions of three major companies expressed this thought in almost identical words: "You can't build up a good export business by treating exports as overflow. We're in the market to stay."

It happens to be true that all three of these companies have found occasion to unload inconvenient quantities of various chemicals into export channels from time to time. The important point is that they consider those ventures

Holding on to World Markets

U.S. Share of Total Imports



1. United Kingdom, Belgium, Luxemburg, Netherlands, W. Germany, France, Italy. 2. Hong Kong, India, Japan, Malaya. Excludes imports into Hong Kong and India from Switzerland and Soviet bloc. 3. Argentina, Brazil, Mexico, Colombia, Venezuela. Excludes imports from Soviet bloc and Switzerland.

Source: Derived from United Nations data.

abnormal ones. And they or their predecessors probably wouldn't have made such a statement a few years ago.

More regular export allocation and pricing is likely when exports are handled by a separate international division, rather than by the product divisions' sales departments. Export sales then become an aim in themselves. Under this arrangement, the international division export manager often makes his market estimates, then negotiates with the product division sales managers on the quantities and prices at which they will be able to get the material for a year or so in advance. If shortages develop, allocation cuts are prorated between domestic and export sales.

Of course, there will always be some "opportunistic" pricing and cut-rate unloading of surplus material. Fertilizer producers, for example, find it most economical to run plants on a continuous basis, even though sales are seasonal. During the slow seasons, they are likely to sell at cut rates.

And chemical producers don't expect to eliminate occasional gluts due to economic slumps or market shifts. When surfeits develop, the international division naturally does its share to dispose of the excess.

The basic reason for this new respect for exports, of course, is the fact that chemical markets abroad are growing faster than they are in this country. U.S. companies now see in the gradual birth of the Common Market the promise of a new mass market comparable in size to that of the U.S.

In their efforts to bag this market, many U.S. companies seemed to look first not to exports, but to foreign-based plants. But, paradoxically, foreign plant growth has sometimes hypoed export selling, too.

Companies decided to build abroad primarily to reap new profits from ready capital and know-how (not to leap the Common Market's tariff wall, as has often been assumed).

As they became more involved in these international operations, company after company found their organizations inadequate. They had to set up new organizations—typically, international divisions with status equal to the product or domestic manufacturing divisions.

These international groups took over responsibility for establishing and running foreign plants. They took charge, too, of licensing arrangements and relations with foreign partners. And they absorbed the functions of the export departments.

A major result—though often not the primary aim—was strengthening of the export effort. For example, reorganization puts a man in high corporate status—sometimes on the board—whose prime concern is international operations. It increases the leverage the export manager can exert in his bargaining for product allocation and price with the domestic divisions. And it consolidates foreign trade know-how, makes it feasible to maintain staffs specializing in overseas promotion—in advertising and public relations.

Closer Control: The trend toward setting up plants abroad has helped exports in another way—by bringing sales control, service, and storage facilities to the area. When a company's activities in an area are restricted to exports, its sales are most often handled at long range, through distributors. The company has little personal contact with its customers, little chance to sense changing market conditions. Foreign plant operation is often accompanied also by a take-over of distributor jobs—including the handling of the parent company's full line (not just the plant's output).

Where the company chooses to keep its distributor setup, it still has much closer control over it, and can offer more help. And a local plant has publicity value that probably helps the company's total sales efforts in the area.

And not to be overlooked is that overseas manufacturing operations also makes exports more profitable. Instead of paying the U.S. corporate tax on its export revenue, a company can hold it in some tax sanctuary like Venezuela, and use the money for foreign operations.

Finally, the total impact of U.S. overseas plant construction should stimulate U.S. exports by furthering the growth of chemical consuming foreign industries, by spurring consumer demand for chemical products and by aiding over-all economic and industrial growth.

Du Pont's Evolution: Du Pont's overseas setup is a vivid—though not typical—example of how moving into overseas manufacturing can help vitalize the handling of exports.

Four years ago Du Pont didn't have a manufacturing plant outside the Western Hemisphere. It had an International Dept., which had only "auxiliary" (staff) status, on a level with engineering and public relations. Exports were handled by each industrial department's export manager, who shipped products to distributors. In Latin America, the company had a handful of subsidiaries, some of which manufactured some products, some of which were only distributors.

In '56, Du Pont formed a subsidiary in London. It began distributing U.S.-made neoprene and Orlon, and locally produced herbicides made under contract by a British company. It also started building a neoprene plant in Northern Ireland.

It was clear by '58 that Du Pont had decided to go into Europe in a big way. It started building an elastomers research lab near London, a finishes plant in Belgium, an Orlon plant in the Netherlands.

And it started organizing its new trading subsidiary for Europe, Du Pont de Nemours International S.A., in Geneva.

In Wilmington, the old International Dept. was boosted to the corporate level of the domestic industrial departments. It could thus serve as liaison between the executive committee and the managers of the overseas subsidiaries, coordinate trade development and export sales policy, and develop new manufacturing opportunities outside the U.S.

Because of the complexity and autonomy of its industrial departments, Du Pont left these departments with their own export managers.

But Du Pont has largely centralized sales in Europe. Du Pont International, S.A., in Geneva has taken over many of the functions which most companies carry out in their international division's home office in the U.S. It's

Growth and Change in U.S. Chemical Exports

Source: Dept. of Commerce.

really a kind of extension of the home office.

Each of the European plants handles its own sales in its own country. Du Pont International S.A. handles them everywhere else in Europe. It also handles sales in some 50 countries and territories in Europe, Africa, the Middle East, even as far off as Australia. After overcoming some reluctance to yield responsibility, the Geneva unit has gradually taken charge of sales in its vast area from all but four of the industrial departments.

Du Pont International is a big operation. Its actual sales are handled by more than 150 distributors. It's divided into product departments like the parent company, sends out technical and sales trouble-shooters to help distributors and their customers, provides a number of testing labs. It even has a staff of product publicity men.

Although the industrial department export managers are not formally coordinated, the International Dept. provides staff services for them. It also supervises six foreign trade development men around the world. They provide technical field representation for all departments who do not have their own men in the field.

More in Line: Dow's international setup is more along the standard line. It is administered by Dow International Ltd. S.A., incorporated in Venezuela, headquartered in Midland, and has 19 sales offices overseas helping distributors.

Dow's interest in exports isn't new. It set up its international company back in '52, and exports now account for about 10.5% of total sales. But in the last two years, the International company has seen a flurry of activity. Dow has launched a massive ($25 million/year) overseas investment program, and the international marketing department has been expanding to meet the coming load. The department has been organized into product divisions, staffed by men experienced in overseas conditions.

In the last two years, Dow has built up its European sales operations, and it now has sales offices in six European countries. They are responsible to European sales headquarters in Zurich. Publicity and advertising are handled from Midland.

Old-Timer: Contrasting Monsanto's operation with Dow's points up how foreign investments (Monsanto's now total $300 million) can influence the foreign sales setup. Monsanto, with 40 years' experience in overseas operations, built up many of its operations as joint ventures. These have been largely autonomous, handle their own sales.

At least partly as a result of this, it only has one office to service its European distributors, and exerts much looser control over its foreign advertising.

Profit Centers: One company still mulling over centralized foreign chemical sales is W. R. Grace. The Overseas Chemical Division handles foreign operations primarily for Dewey and Almy and Cryovac divisions. Here, it has tied a firm bond between its exports and overseas manufacturing operations. Whenever the division, for example, builds an overseas plant, it defines an area around it as a "profit" or "territory center." Within this area, the plant manager—usually a national—has complete responsibility for all of the division's exports into the area, as well as responsibility for the products made there.

In the coming months, Grace may reorganize and consolidate its other overseas chemical activities. First step in this direction came a few months ago with the renaming of the Dewey and Almy Overseas Division. So far, it is little more than a name change, prompted by plans to go into new products—phthalates, polymers, magnets—not associated with the divisions. Now Grace faces the problem of wedding the Overseas Division's long export experience with the product knowledge of the other chemical divisions.

Sense of Centralization: Grace's problem is not unique, although many companies may have rushed to set up a centralized international operation before solving it.

When a company has several product lines, sold to different types of industries or customers, it makes sense to split their international operations, according to Ralph Smiley, president of Booz-Allen & Hamilton International, management consultants.

"For many products," another observer of international business adds "there is less similarity between the products and their uses than there is between the countries they are sold in."

Big companies—e.g., Monsanto and Dow—can afford to staff an international organization with experts in all the product lines, these people say, but what about the smaller firms? Smiley has worked with several U.S. and European companies that have decided to break up their international operations, believes it is part of a trend.

One way to do this, suggest some industry men, is to skip using sales offices, and work directly with carefully selected distributors—if you can find good ones that aren't already booked up.

One Steps Back: Goodyear Chemicals' experience may be an early example of this trend toward decentralization. Until '57, export chemical sales were handled within the company's Goodyear International Corp. by a unit called Specialty Sales. It dealt in chemicals and all other Goodyear products except tires and aircraft. In effect, this unit was simply taking orders. When Goodyear decided to push chemical exports, it set up a Chemical Division within the same International Corp.; the division manager reports directly to the head of the domestic chemical division.

The International Corp. looks after commercial and financial matters, provides some auxiliary services. But the domestic chemical division sets the sales policies, directs the technical services, marketing and foreign representation.

Even when an international division is big enough to have its own product specialists, they are bound to run into problems they can't solve themselves. Companies like Dow and Monsanto solve these by "hiring" experts temporarily from their domestic divisions and sending them abroad.

"The success of centralization depends on liaison between the international and manufacturing divisions, and the corporate directors," says Edward Seaton, an assistant general manager of Monsanto's Overseas Division. To assure it, his company has an associate sales director assigned to divisional liaison.

Poor liaison and overcentralization can result in the international division becoming a world unto itself, says Booz-Allen's Smiley. Its decisions then may not always take into account the maximum profit interests of the corporation as a whole.

For example, an international division may decide that it can make a greater profit by producing a product in one of its overseas markets instead of "buying" it from the U.S. product division and having it shipped abroad. In the narrow frame of reference of the international subsidiary, the proposal might make sense. But it should be viewed in the frame of the corporation's entire economic structure—and it might be more economical to run the domestic plant at capacity even at the cost of reducing the international division's profit.

Seaton notes that Monsanto does not use the conventional system in which the international division "buys" its materials from the product division, and is supposed to sell them at profit. At Monsanto, he says, the international division is not set up to show a sales profit as such. The product division has final say on the export price and turns its goods over to the international division at that price. This system, he feels, is partly responsible for the fact that the division sees all of its decisions in the light of total corporate profit.

PRICE VS. PROFIT

After he listens to all the government pep talks, ponders the criticisms of what he has done wrong, or what he isn't doing at all, and mulls the pros and cons of the many variations of international organizations, the beleaguered management man may well sit back and ask, "So what? Are exports worth all the trouble? With the kind of price competition we're facing, can I come out with a decent profit?"

"Price," insists a government trade promotion official, "is not the sole factor. I see over and over again people willing to pay premium prices for U.S. products—including industrial products."

A number of chemical industry men agree. "Competitors are working on a price basis," a Grace export man says of the Germans, Italians, and Japanese entering the can-sealing compound market. "We can lick them, because we're competing on product engineering . . . The total gross profits on our exports are just as high as domestic sales."

Says another, Oronite's T. G. Hughes: "The overseas customers of California Chemical International are treated no differently than domestic customers in either price or product availability. There is no management problem in determining the proper relationship of domestic and export marketing efforts, because domestic and foreign sales are equally profitable. Both are promoted with vigor." He also notes a "significant increase" in Oronite's exports over the last five years.

But not all exporters are so fortunate, a CHEMICAL WEEK spot-check shows.

In Southern Rhodesia, price "invariably" determines

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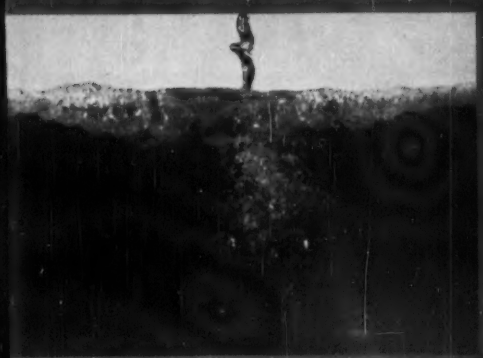
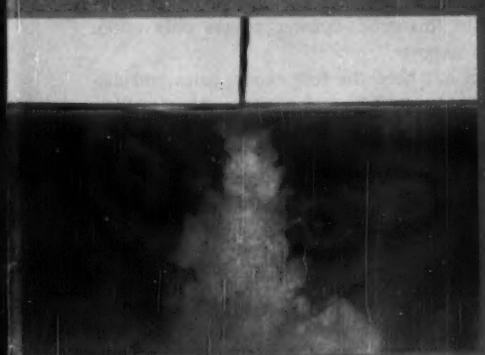


1 Two immiscible phases separate immediately when a hydrocarbon solvent containing no emulsifier is poured into water.



2 The same solvent containing 3% of a poorly balanced blend of anionic-nonionic emulsifiers forms only a fair emulsion in water.

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where the Rhodesian Federation buys. Buyers say that U.S. prices are not competitive, and better services, better credits, or harder selling can't change that.

In Mexico, chemical users say they prefer U.S. products, but the lower prices and credits offered by Europeans and the Japanese are pulling them away. In Brazil, European chemicals from both sides of the Iron Curtain are generally priced well below those from the U.S.—by as much as 30%, in some cases. This would be a big barrier to more trade even if U.S. exporters were actively courting Brazilian buyers—which few of them do.

On the other hand, U.S. exports to Europe are booming. In many products, notably plastics, the U.S. holds a cost edge. But it is still often necessary to slash prices well below domestic levels, a practice all the more painful because hefty freight rates and duties must be absorbed.

Is this profitable? "It depends on what you mean by profit," is an exporter's stock reply. "It is if you look at the total production picture." Domestic sales managers tend to set prices on the principle that each unit produced and sold must bear an equal share of the total costs. Many export men express sympathy with this idea, but few would abide by it if it meant losing a sale. They believe the profit margin on export sales need not be as great as on domestic sales, that the company still gains in added volume.

Many export people go further than this. They feel that if a sale can only be made at a certain maximum price, it should be made, so long as the price is reasonably above the actual cost of producing the extra goods in question.

Encouraged Exports: Domestic sales managers frequently go along with this thinking when sales aren't doing very well and they have excess inventory or slack capacity on their hands. But they are a lot stuffier about it when business is so good that exporting means depriving the domestic market.

Aside from this question of marginal cost, some trade people—and government officials—believe it is wrong to base export price on a domestic price that includes such charges as domestic service and advertising costs.

The upshot is that many exporters pay scant attention to domestic prices. This is especially true with commodity chemicals, such as fertilizer materials.

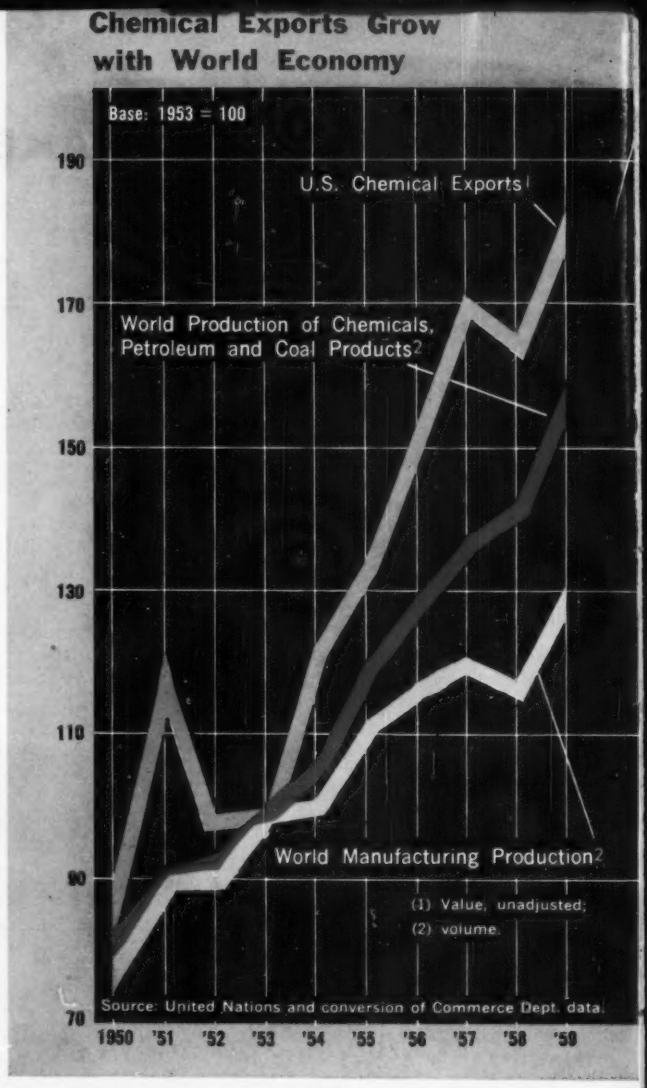
Freight makes it practically impossible to cling to domestic prices in competitive situations. Goodyear Chemical, for example, has found it necessary to convert its price schedule from f.a.s. basic (the domestic price) to c.i.f. or c.&f. prices, take into account competitors' freight rates.

Says Goodyear International Chemical's Raymond Earhart, "If we can't set a price like that, we don't have a price for that country. We just don't sell there."

Where's the Profit: On the evidence, it would seem that exports are often not as profitable as domestic sales. This is the subject that export men like to talk about least.

There are, however, certain well-known ways to beef up export profits. Holding export earnings in tax sanctuaries and investing them in low tax countries is one.

Under the Western Hemisphere Trading Act, companies set up for it pay only a 38% tax on income earned



trading in Canada, Central and South America. This gives leeway for cutting price and still coming out ahead on domestic profits taxed at 52%—especially when the corporation, by discreet intracompany charging, can reduce the profits taxable under the high rate and increase those under the low. But this profit-booster covers only about half of total U.S. exports.

Another cushion has been the low export sales and distribution costs, relative to U.S. sales costs. Most selling overseas is done through distributors working on commision, rather than employees—comparatively, a low-cost operation. But if U.S. exporters really get aggressive, these sales costs should go up.

Indeed, it's worth pondering (for a moment) what would happen if Douglas Dillon's wildest dreams came true and exports became a major part of total U.S. chemical sales. If costs mounted, as would seem to be unavoidable, exports could exert an embarrassing pinch on corporate profits.

No Danger: However, few (if any) observers anticipate such a development. With competition getting tighter all the time, industry people expect it will be hard enough to keep chemical exports expanding at the present rate.

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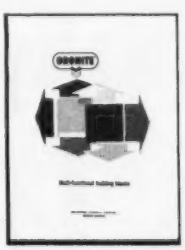

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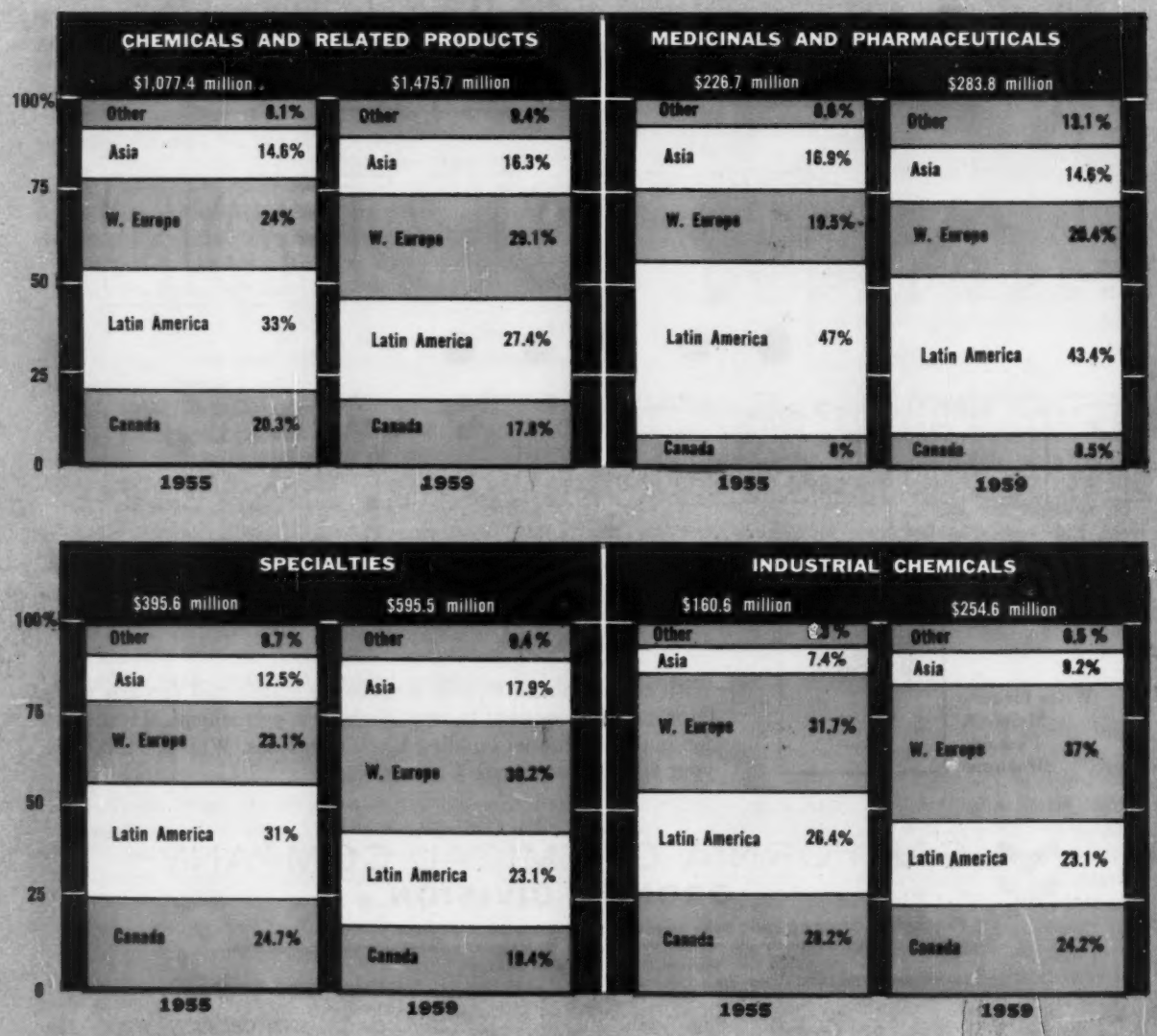
be enough instability in the developing nations in Asia, Latin America, and Africa to cripple their progress. If they are allowed and helped to build a modern economy, they will open wider markets for chemicals. In Asia, especially in India and Indonesia, the vast potential pharmaceutical market will attract more plants, including U.S. establishments that will import intermediates from this country.

As industry grows, the Philippines, Pakistan and the others will need more organics, solvents, plastics, and agricultural chemicals. If currency restrictions are removed, U.S. companies will have a better chance in these markets, though they will buck against Japan in unsophisticated Asian markets where price is the most important factor.

Given foreign economic aid and a chance to earn foreign exchange, Latin America will need more fertilizers despite the new projects coming onstream. Pesticides should be a major market, and a whole range of industrial chemicals and specialties will be needed, even while the trend towards local production continues.

In Japan, new petrochemical plants have been coming onstream, but the industry's costs are high, and the market is still open to competition from the U.S. The U.S. position has been aided by the fact that Japan has recently placed

Shifting Markets for U.S. Chemicals



Source: Dept. of Commerce.

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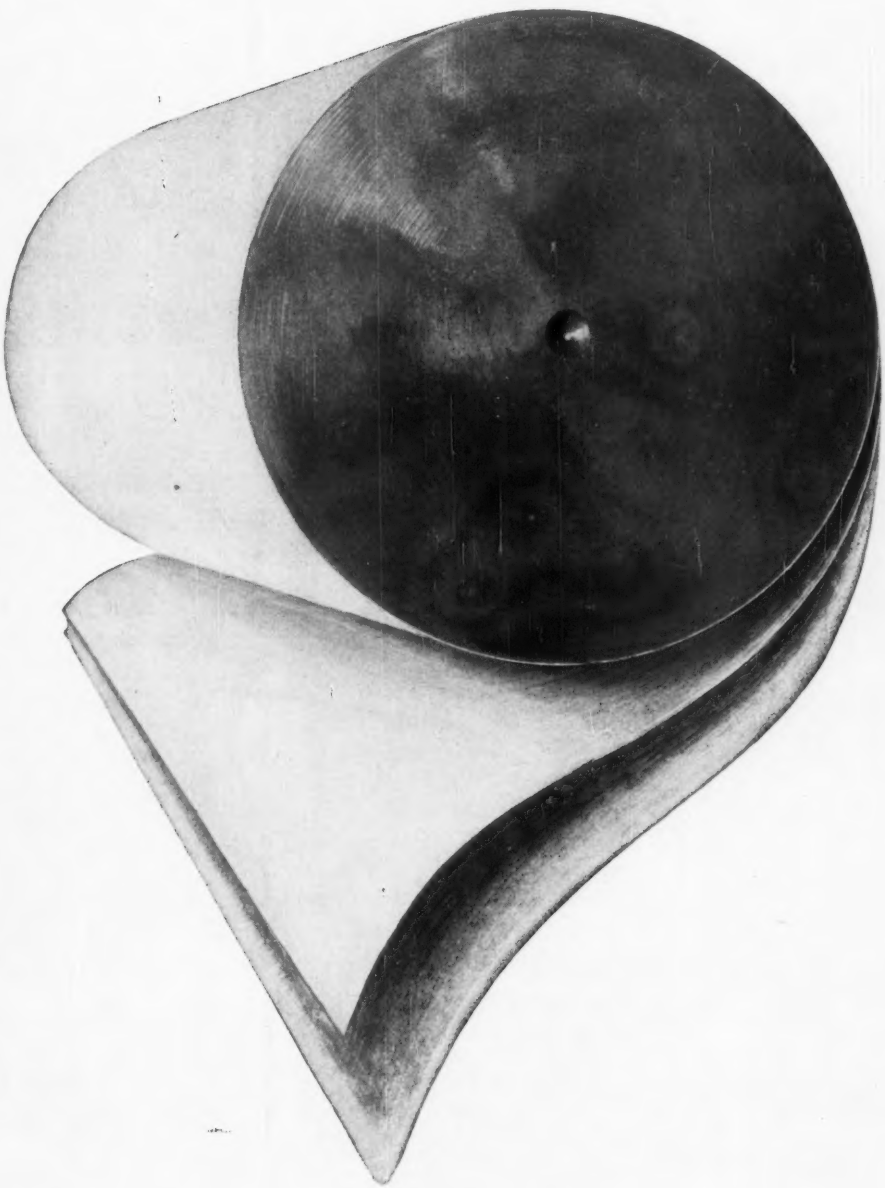

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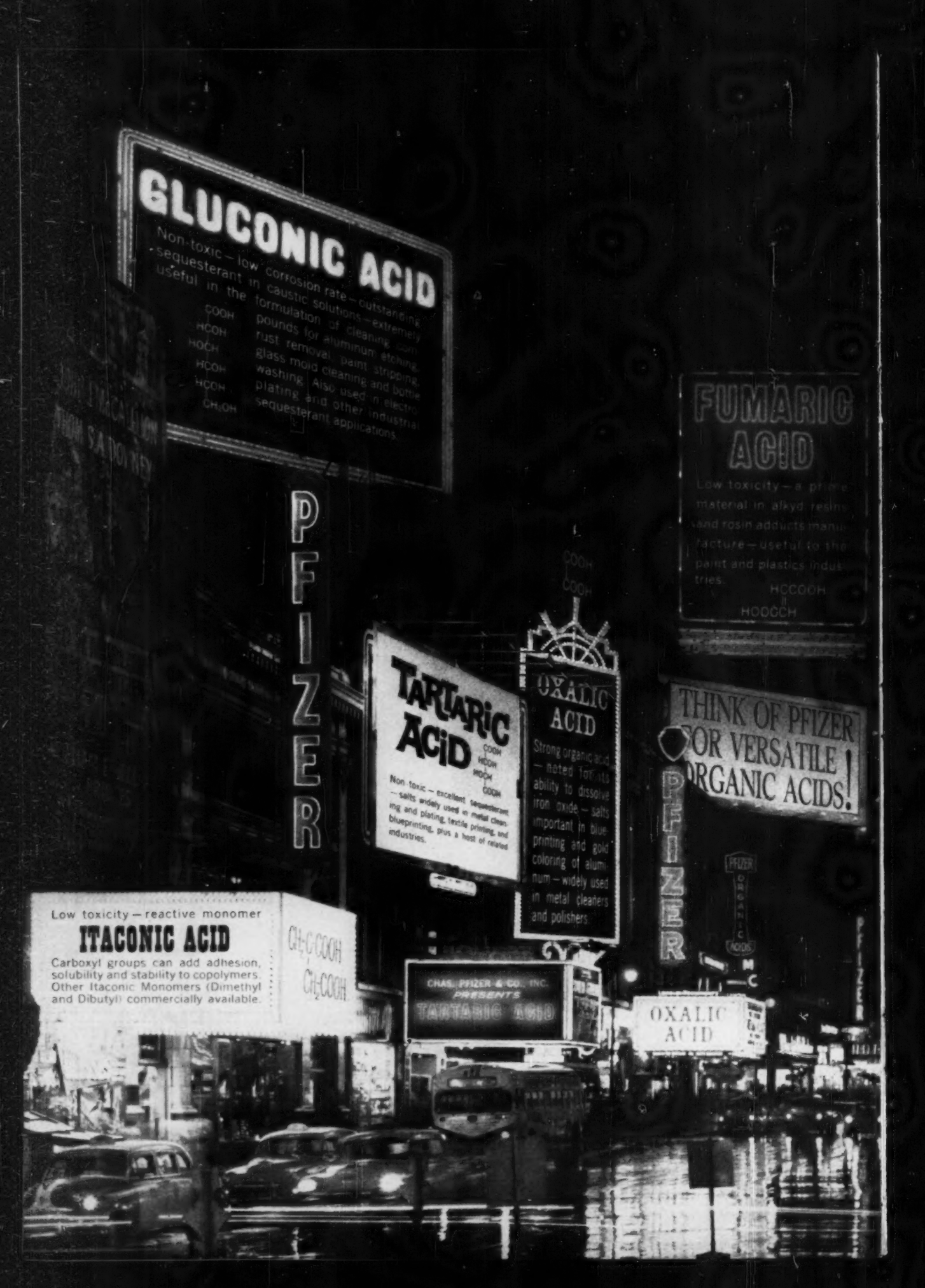
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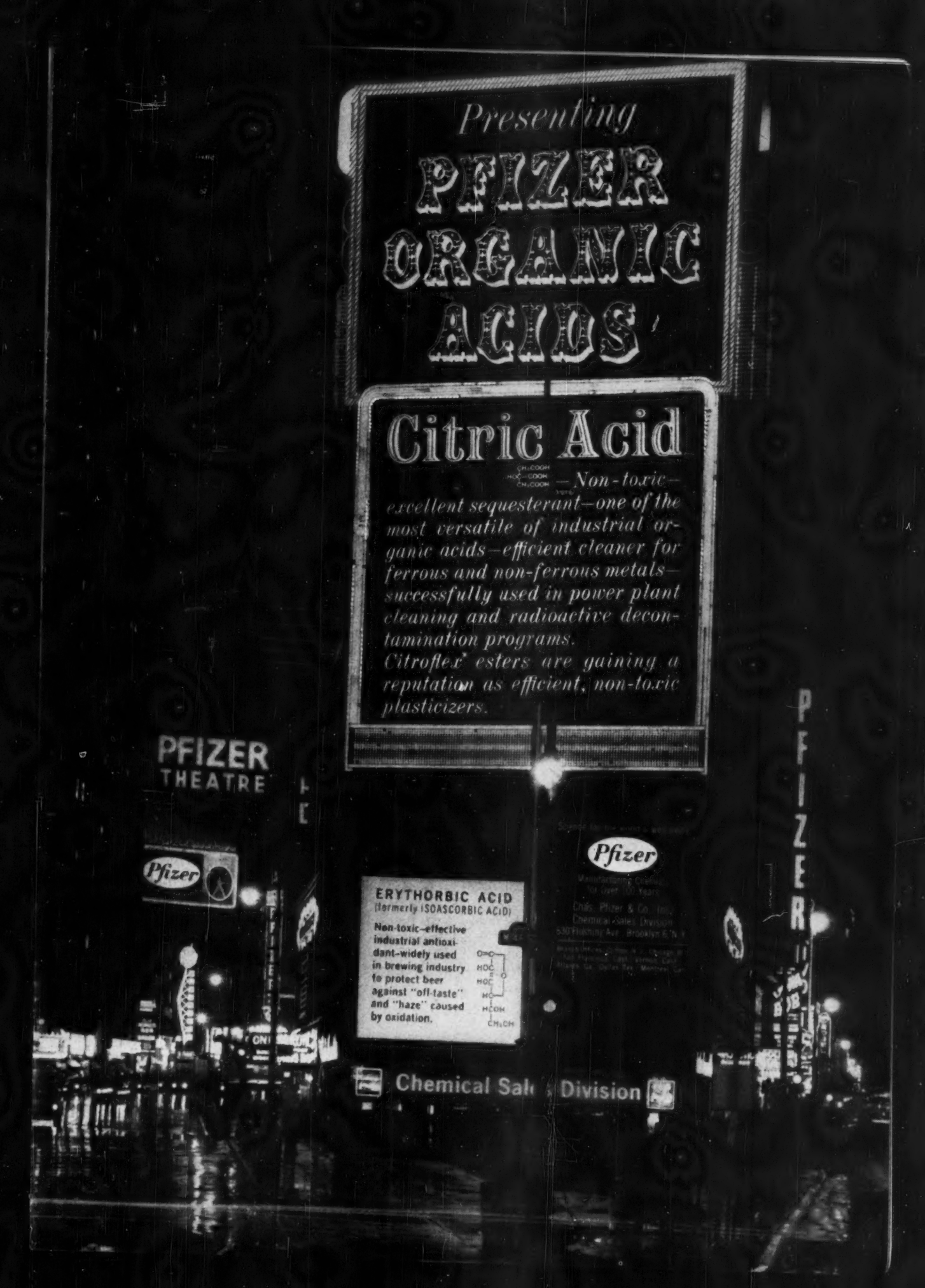
Non-toxic – excellent sequesterant – salts widely used in metal cleaning and plating, textile printing, and blueprinting, plus a host of related industries.
OXALIC ACID
Strong organic acid – noted for its ability to dissolve iron oxide – salts important in blueprinting and gold coloring of aluminum – widely used in metal cleaners and polishers.
THINK OF PFIZER FOR VERSATILE ORGANIC ACIDS!
PFIZER
Low toxicity – reactive monomer
ITACONIC ACID
Carboxyl groups can add adhesion, solubility and stability to copolymers. Other Itaconic Monomers (Dimethyl and Dibutyl) commercially available.
CHS. PFIZER & CO., INC. PRESENTS
TARTARIC ACID
OXALIC ACID


Presenting
PFIZER
ORGANIC
ACIDS
Citric Acid
—Non-toxic—excellent sequesterant—one of the most versatile of industrial organic acids—efficient cleaner for ferrous and non-ferrous metals—successfully used in power plant cleaning and radioactive decontamination programs.
Citroflex esters are gaining a reputation as efficient, non-toxic plasticizers.
PFIZER
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Pfizer
ERYTHORBIC ACID
(formerly ISOASCORBIC ACID)
Non-toxic—effective industrial antioxidant—widely used in brewing industry to protect beer against "off-taste" and "haze" caused by oxidation.
Pfizer
Chemical Sale Division
PFIZER

Exports Help Balance Home Market

Product (million pounds)	1955	1956	1957	1958	1959
ETHYLENE GLYCOL					
Production	888.2	1,020.7	1,199.9	1,145.5	1,214.6
Sales (not used captively)	392.6	439.2	545.1	530.3	630.2
Exports as percent of sales	13.3%	12.9%	25.1%	9.7%	20.7%
Unit value of total sales ($)	0.117	0.12	0.116	0.106	0.099
Unit value of exports	0.105	0.107	0.112	0.124	0.11
PHENOL					
Production	516.7	549.2	556.3	506.4	692
Sales (not used captively)	280.3	302.6	289.5	281.1	414.3
Exports as percent of sales	13.1%	13.8%	6.2%	14.5%	9.5%
Unit value of total sales ($)	0.148	0.157	0.162	0.155	0.145
Unit value of exports	0.143	0.158	0.151	0.138	0.15
BUTANOL					
Production	475.4	515	487.1	505.1	546.1
Sales (not used captively)	176.5	182.3	193.7	207.7	236.4
Exports as percent of sales	21.1%	19.4%	20.1%	33%	19.6%
Unit value of total sales ($)	0.119	0.127	0.126	0.123	0.124
Unit value of exports	0.109	0.112	0.128	0.119	0.121

Source: U.S. Tariff Commission and Dept. of Commerce.

more than 140 chemicals on its automatic import license approval list.

The Japanese can compete on world markets with urea and melamine resins, but not in many other plastics (including phenolic, polyester, vinyl chloride, polyethylene, polystyrene, etc.).

The trade liberalization between the U.S. and Japan is also expected to spur imports of polio vaccine, caffeine and vitamin B_2, along with dyestuffs for synthetic fibers.

AHEAD IN EUROPE

With its looming trade blocs, Europe is our biggest chemical market and our biggest worry. How high the tariff walls will finally grow, and what they will encompass, is still an unknown.

But even assuming the two blocs fulfill their plans, U.S. industry men expect the market will continue to be important, though some believe volume may decline.

And Europeans expect to continue buying from us. German chemical industry men believe imports from the U.S. will continue rising 25%/year in the foreseeable future. France expects imports will continue rising if its industrial expansion continues.

The British, highly critical of U.S. export attitudes, expect our costs to rise still higher, and don't believe there is much real hope for U.S. imports in Europe. But they see sales potentials for technically advanced chemicals and for bulk raw materials such as benzene.

New Product Bulge: Most U.S. industry men believe that our export pattern will gradually shift to the highly processed materials.

At Monsanto's sleek administrative park in the countryside outside St. Louis, international executive Seaton points to the new research center under construction and says, "That's why we'll keep on exporting."

It seems to be the consensus. Britishers acknowledge the big American asset: the big U.S. economy supports greater research and development of new products, economic production of a wider range of grades, a lead in putting the chemical into large-scale production. When producers have a unique, important product, price competitiveness and tariffs scarcely figure.

A U.S. government commodity official elaborates, "We have a technological lead over Europe of about five years, and I see no reason why we shouldn't keep it." And often, the market for a new product developed here grows slowly. Later, it catches on more rapidly abroad, leaving us in a position to supply the market.

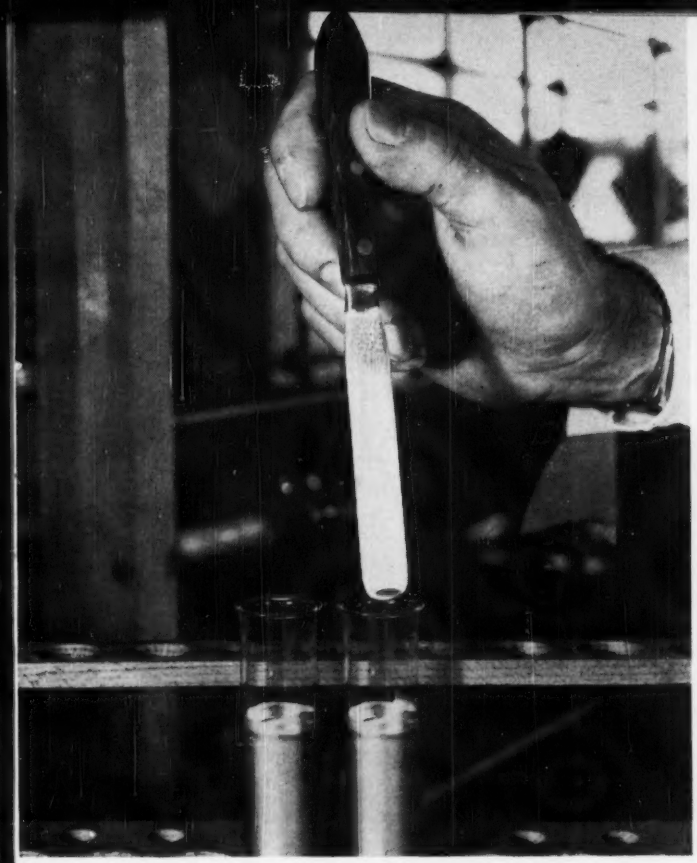
"Polyethylene is an example. So is glycerin. Shell started producing it more than a year ago in the Netherlands, but the country is still importing about twice as much as it used to, before the plant went onstream."

Seaton cites a similar example with polystyrene. "We have polystyrene plants in 10 countries, yet our polystyrene exports keep regularly increasing." And as local output gradually supplants imports of standard types, demand develops for special types, which can't be made in the foreign country.

Import Chain: Technological innovation sets off a chain. Japan has built its synthetic rubber plants (with U.S. technology), but now it will import rubber chemicals. Synthetic rubber plants have sprung up all over the world, in fact. But U.S. exports hold up, supplying the special-purpose types.

But predominance in some new product lines will not exempt U.S. companies from the struggle against foreign competition. That's clear from the gains overseas producers are already making in this country's export markets. If U.S. exporters are to make full use of their technological advantages, and maintain their pre-eminence in world trade, they will have to work harder than most have done so far.

Copies of this report will be available at $1 each from CW Reprint Dept.



NEVILLE COUMARONE-INDENE RESIN was mixed with aluminum pigment and petroleum spirits in this test. The picture was taken exactly three minutes after the spatula was removed from the test tube. Leafing has risen to 78% of the immersed surface.

COMPETITIVE RESIN used in this otherwise identical test formula was a well-known hydrocarbon petroleum type. Test procedure was exactly the same, and after three minutes complete leafing had occurred on only 46% of the area of immersion.

Try this aluminum pigment leafing test pitting Neville C-I® Resin against others

To arrive at the evidence shown above, our technicians followed test procedures as outlined under ASTM 480-59T for the leafing properties of aluminum pigments, except that we used two resins while retaining the same pigment. We believe the leafing advantage gained through the use of Neville Coumarone-Indene Resin is completely self-evident in the left-hand picture.

But there are several other benefits to be enjoyed through the use of Neville C-I Resin beyond superior initial leafing. Leaf retention is also excellent, as is resistance to water, acid and alkali. Coatings dry quickly and are durable, flexible and uniform. Use the coupon below to write for Neville's new aluminum paint bulletin.

Resins—Coumarone-Indene, Heat Reactive, Phenol Modified Coumarone-Indene, Petroleum, Styrenated, Alkylated Phenol • **Oils**—Shingle Stain, Neutral, Plasticizing, Rubber Reclaiming • **Solvents**—2-50-W Hi-Flash*, Wire Enamel Thinners, Nevsolv* • **High Purity Indene.**

*Trademark

Neville Chemical Company, Pittsburgh 25, Pa.

NEVILLE®

☐ Please send me Neville's free new aluminum paint bulletin.

NAME TITLE

COMPANY

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CITY STATE

ANNOUNCING UNITOL CMT PALEST TALL OIL FATTY ACID EVER MARKETED

If you've ever hesitated about using a tall oil fatty acid in the past because of color, new UNITOL CMT is the product you've been waiting for. With a typical Gardner color of 1+, UNITOL CMT is the palest tall oil fatty acid ever produced in commercial quantities and is ideally suited for use in processes with stringent color requirements such as vinyl plasticizers, surfactants and baking vehicles. Moreover, its high purity and uniformity suggest that it will perform extremely well wherever the need for a premium fatty acid is indicated. Samples are available now for testing. Just clip the coupon below.

unitol UNION-CAMP®

CHEMICAL PRODUCTS DIVISION

Union Bag-Camp Paper Corporation · 233 Broadway N.Y. 7, N.Y

Union Bag-Camp Paper Corporation · 233 Broadway N.Y. 7, N.Y

YES: Please send a data sheet, sample and price information on new UNITOL CMT.

NAME _____

TITLE _____

COMPANY _____

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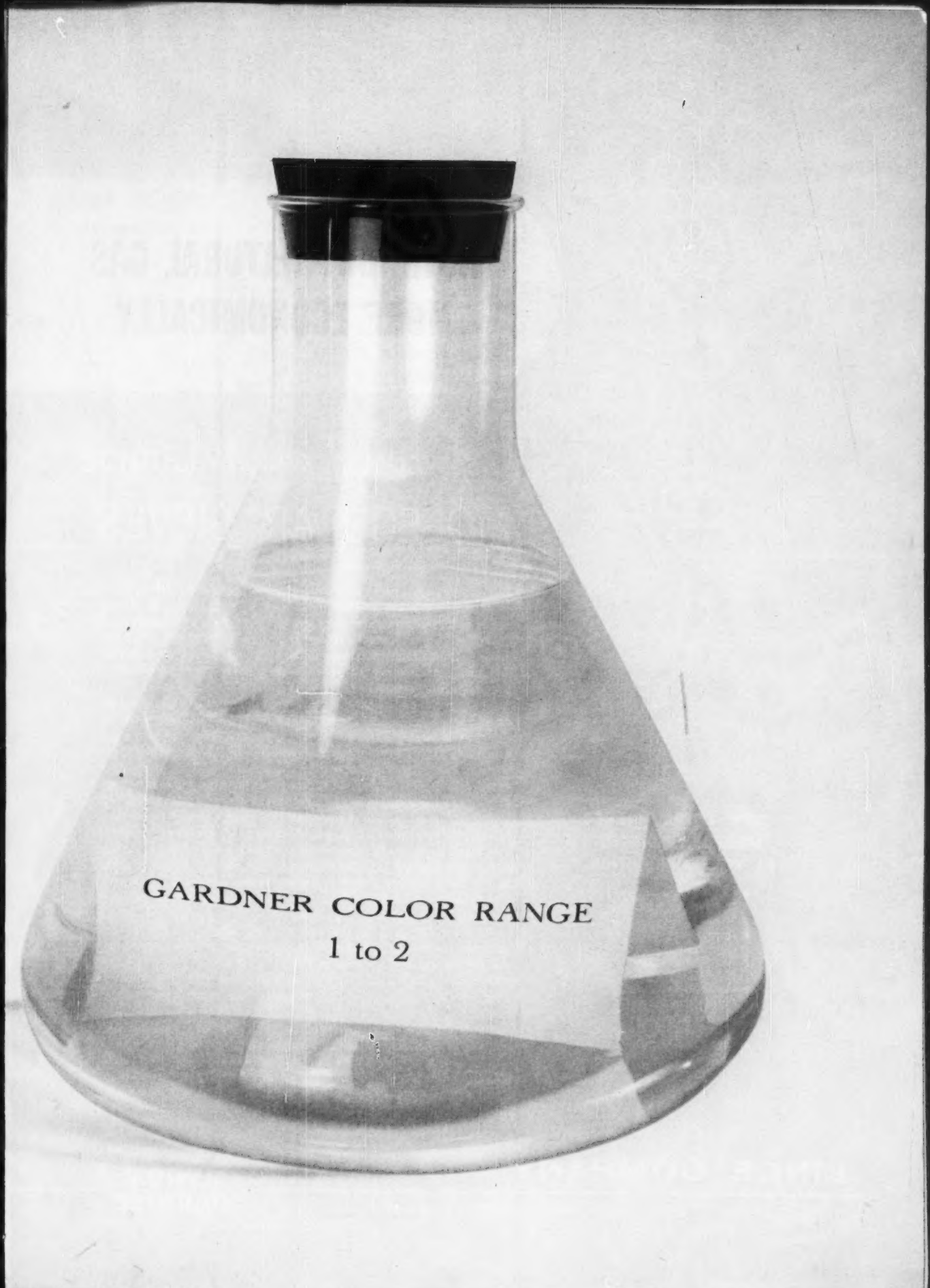
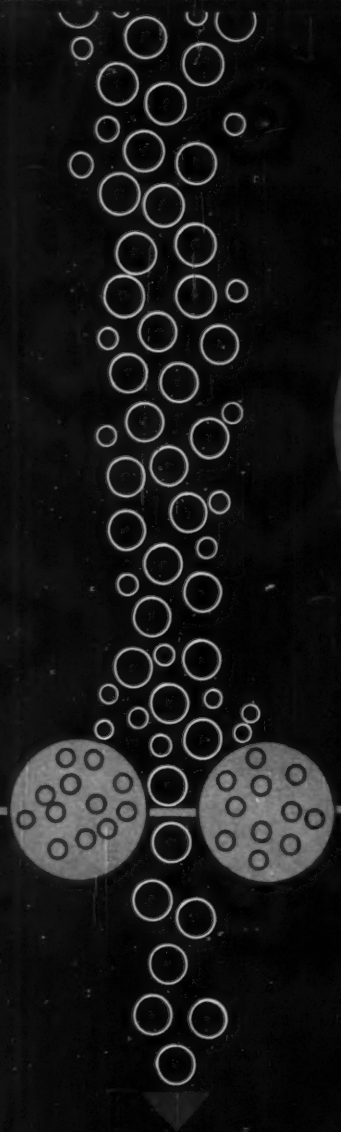
STATE _____ CW


GARDNER COLOR RANGE
1 to 2

STATE _____ CW



NOW—DRY NATURAL GAS MORE ECONOMICALLY

...WHEN YOU ADSORB WITH LINDE MOLECULAR SIEVES

This is only one of many applications which utilize the high capacity and selectivity of LINDE Molecular Sieves. In fact, Molecular Sieves not only outperform other adsorbents, but do other adsorption jobs never before accomplished. Whether in new installations or as replacement adsorbent in existing units, Molecular Sieves can help you minimize both investment and operating costs. More specifically, here's how they are used. . .

A major petrochemical company has reduced the CO_2 content of its ethylene from 3000 PPM to less than 1PPM. This high purity is achieved in a single-stage process, automatic and non-corrosive, which has proved to be more economical than the alternative four-stage process. Other petrochemical uses include drying of cracked gases, ethylene, hydrogen, liquid propylene, solvents and many other gases and liquids. **Natural gas producers** use Molecular Sieves for drying and sweetening of natural gas, for sweetening of liquid propane and butane, and for drying of adsorber oil. **Petroleum refiners** use them to gain efficiency in drying reformer hydrogen, liquid butane LPG and transformer oil, and for removal of impurities such as CO_2 and mercaptans **Refrigeration manufacturers** use Molecular Sieves as a desiccant in super-drying refrigerants to eliminate freeze-up and corrosion.

For these and many other adsorbent applications, you can rely on patented LINDE Molecular Sieves to perform more effectively. They are the top quality material of their kind available today, always uniform, with high capacity, high strength, and high bulk density. They are available in regular and special grades to meet your specifications.

LINDE technical know-how—gained from years of laboratory and field work with adsorption problems—can help make Molecular Sieves work profitably for you. For further information, write: Dept. CW-114 Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. **In Canada:** Linde Company, Division of Union Carbide Canada Limited, Toronto 7, Canada.

SOME AREAS WHERE MOLECULAR SIEVES IMPROVE ADSORPTION

- Purification of ethylene
- Drying gases, liquids, solvents
- Drying, sweetening natural gas
- Sweetening liquid propane, butane
- Drying jet fuels
- Octane improvement
- As refrigerant desiccant
- Controlled atmosphere purification

LINDE COMPANY

UNION CARBIDE

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Technology
Newsletter

CHEMICAL WEEK
November 26, 1960

Manufacture of carbon black from anthracite looks promising, according to new findings by Pennsylvania State University researchers Masayuki Kawahata and P. L. Walker, Jr. Their proposed commercial process involves treatment of the coal with steam (liberating hydrogen and carbon monoxide), followed by high-temperature treatment with chlorine gas. Chlorine reduces significant anthracite impurities, with the exception of iron, silicon and titanium (which are considered insignificant). Under optimum conditions, a gram of activated carbon made from anthracite (activation involves opening pore structure, increasing ability to hold gases or liquids) would adsorb 0.7 grams of carbon tetrachloride gas.

•

The steam reforming route to ammonia from natural gas gets a boost from two plants coming onstream in southern France. In these plants, the pressure of reforming natural gas has been pushed up to 250 lbs./sq.in—believed to be a new high. This cuts compression costs, a major expense in ammonia synthesis. Since about four volumes of synthesis gas result from 2½ volumes of feed gas, operating costs are cut, and synthesis gas compression stages are reduced to three. Key to the higher reforming pressure is a modified furnace developed by Chemical Construction Corp.

•

A standardized zeta-potential meter (Zetameter) promised by T.M. Riddick & Associates (*CW, Aug. 6, p. 26*) is now being offered commercially by Komline-Sanderson Engineering Corp. (Peapack, N.J.). The meter permits rapid measurement of the electric potential—due to an excess or deficiency of attached electrons—which causes colloidal particles to repel each other and stay in suspension. With the zeta potential determined, polyelectrolytes can be added to reduce it to zero, allowing the colloids to agglomerate and precipitate.

•

A mortar produced with organic chemicals (undisclosed) reportedly makes brick or tile mortar joints as strong as the material itself. The use of organic chemicals in mortar manufacture is a costly innovation but the high structural strength achieved is said to more than make up for the increased cost: the mortar-to-brick bond is five times as strong as the conventional bond, permitting the building of clay masonry walls half their current thickness. The new mortar was developed by Structural Clay Products Research Foundation (Geneva, Ill.) and Dow Chemical. Final field testing is still six months to a year away.

•

General Electric is now talking 6-10 day gas turbine installation as a result of its first sales of package units to an electric utility. Cost would be below $190/hp. installed for a simple cycle turbine with 23% thermal efficiency. This compares favorably with a jet engine-gas turbine installation of the type just completed by Cooper-Bessemer and Pratt & Whitney (*also see p. 84*).

Technology

Newsletter

(Continued)

A new family of electronic devices may result from work with minute metal-metal oxide "sandwiches" at General Electric and Arthur D. Little. GE researcher Ivar Giaever is credited with the discovery that thin films of metal (aluminum, lead, indium, or tin) separated by a 10-100-atoms-thick insulating layer (aluminum oxide, tantalum oxide, niobium oxide, or nickel oxide) have "negative resistance" at –450 F. This means that current decreases with increasing voltage, opens possible uses for the device as a switch, diode, negative-resistance diode, triode, resistor or capacitor. ADL has also experimented with the technique, using strips of lead over aluminum oxide, calls this a "tunneltron" (so-called because electrons "tunnel" through the insulator). GE hasn't yet named its experimental sandwiches.

•

Combustible cartridge cases for use in tank guns are a new development for the Army by Armour Research Foundation (Chicago). Composition of the casing is classified. But the material is said to be about a tenth as light as brass and less expensive. It is easier to store, ship and handle, and resists dents and scratches. No residue (which could cause premature detonation of the succeeding round) is left in the gun tube after firing, and noxious gases and hot, spent cases in the tank are eliminated. ARF designed the new shell material—which may ultimately be used in all Army guns—under a contract with Picatinny Arsenal and the Ballistics Research Laboratories.

•

A new technique to simulate radioactive fallout has been devised by Technical Operations, Inc. (Burlington, Mass.). It can be used to study the shelter protection offered by typical homes and public buildings. The technique utilizes a sealed 10-curie cobalt-60 source hydraulically pumped through polyethylene tubing arranged in concentric circles around a model of the building to be tested. Dosimeters reveal the relative radiation in each part of the building.

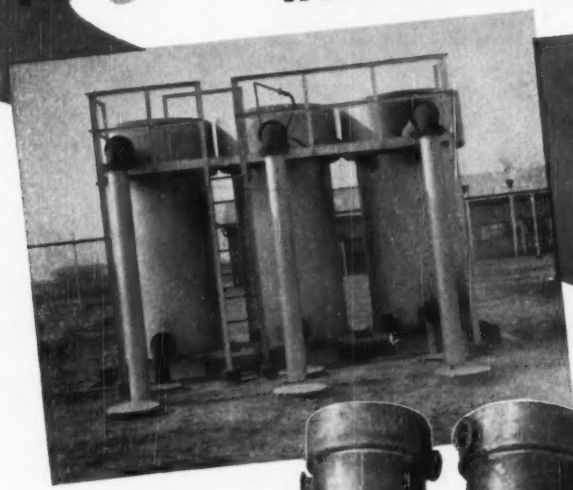
•

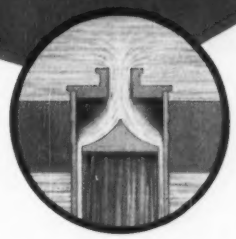
Long-waited commercial quantities of the titanium-palladium alloy developed by Union Carbide Metals Co. for improving titanium's corrosion resistance (*CW, April 18, '59, p. 76*) will be available soon. Titanium Metals Corp. of America (New York) has just become the first licensee of the alloy, after testing it extensively. The new alloy, designated Ti-Pd by TMCA, permits titanium to be used in reducing environments (e.g., in strong reducing acids such as sulfuric and hydrochloric, where titanium can't be used unalloyed). And it might well become the standard grade of titanium used by the chemical industry.

The alloy will contain 0.15% palladium (slightly more than the 0.1% originally suggested when development started). It has the same fabrication characteristics as commercially pure Ti 55A grade, according to TMCA. Cost of the alloy has not yet been revealed, but it will probably add between 50¢ to $1/lb. to price of Ti 55A, which now sells for $3.70/lb. in billet form and $8.50/lb. in sheet form.

NOW HIGH HEAT TRANSFER RATE with LOW PRESSURE DROP

Another Vogt Engineering Achievement



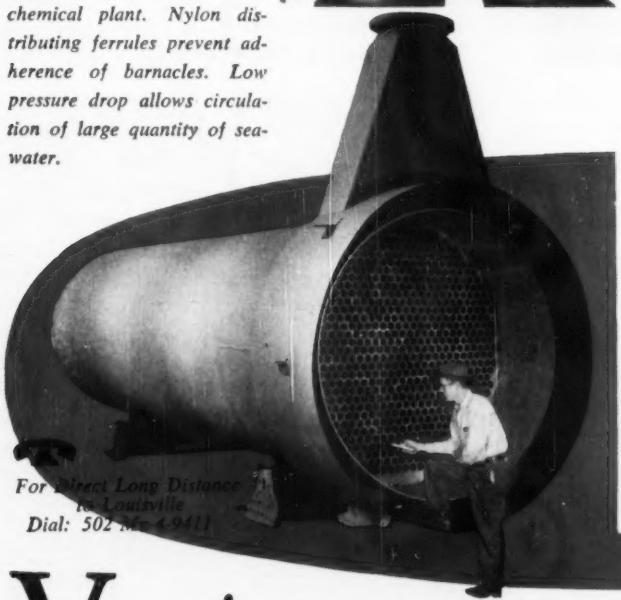


*One of the many distributor types developed for various applications.**

TOP: *Muddy well water is the coolant for these Jacket Water Coolers.*

RIGHT: *Two 56" Dia. x 12'0" high Amine Solution Coolers with expansion joints in shell.*

BOTTOM: *One of a number of seawater cycle units for a chemical plant. Nylon distributing ferrules prevent adherence of barnacles. Low pressure drop allows circulation of large quantity of seawater.*



For Direct Long Distance ... to Louisville Dial: 502 Me 4-9411

*Covered by Pat Nos. 2,057,597, 2,424,441 and others pending.

Special metering distributors control the flow in vertical Vogt film type exchangers of single tube-pass design. The liquid is spread in a uniform film over the inside surface of the tubes. Since the liquid falls by gravity, good velocity is obtained with a small quantity of liquid.

Vogt has developed many types of distributors which are made from a variety of materials to accommodate the fluids circulated through the tubes in specific processing operations.

A unique feature of these exchangers is that the tube side can be cleaned while in operation.

Vogt Film Type Exchangers are used as Coolers, Condensers, Absorbers, Heaters, and Evaporators.

Other Vogt Products

Forged Steel Valves and Fittings. Petroleum Refinery and Chemical Plant Equipment. Steam Generators. Heat Exchangers. Ice Making & Refrigerating Equipment.

BULLETIN HE-8

Bulletin HE-8 describes unusual and standard Vogt Heat Transfer Equipment and is available upon request. Address Dept. 24A-XCW.

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SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J., St. Louis, Charleston, W. Va., Cincinnati, Los Angeles

Vogt FILM-TYPE HEAT EXCHANGERS

For customers demanding consistent high quality—

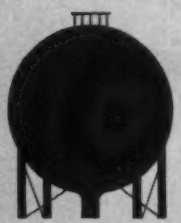
ATLANTIC PETROCHEMICALS

a versatile family of products performing hundreds of important industrial jobs

Described here are but a few of the many uses of this versatile chemical family. The consistent high quality and adaptability of Atlantic Petrochemicals can be of considerable benefit in the manufacture of your products. For more information, consult an Atlantic sales engineer. A graduate chemist or chemical engineer, he is ready to provide the latest technical information available for improving products or processes, new applications, and ways to cut costs. Put his know-how to work by writing: Chemicals Division, The Atlantic Refining Company, 260 South Broad Street, Philadelphia 1, Pa.

TECHNICAL EICOSANE

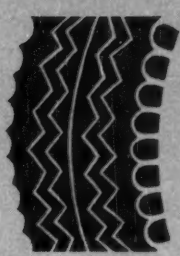
Technical Eicosane is a normal paraffin containing essentially twenty carbon atoms. It has a low melting point (96.5° F) and chlorinates readily to produce compounds of outstanding stability with low viscosities and high chlorine content. Such chlorinated compounds offer a variety of applications. Here are just a few: flameproofing fabrics, as a raw material for automotive lubricant additives, and as a chemical plasticizer.



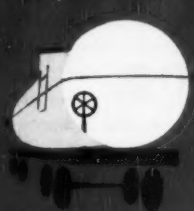
ANHYDROUS AMMONIA

This chemical raw material contributes much to agricultural and industrial progress. It is one of the simplest chemical compounds, yet its uses are many and varied. Here are but a few: as a valuable plant nutrient which can be applied directly to soil, as a source of nitrogen for the nitriding of alloy steels, in the production of explosives and high-energy rocket fuels and as a source of hydrogen for the bright-annealing of stainless steels.

ULTRAWETS® The alkyl aryl sulfonates meet the needs of industry by offering consistent high quality in literally hundreds of cleaning formulations ranging from hair shampoos to railroad locomotive cleaners. Other uses: surface-active agents for wet textile processing, stabilizers in latex paint, in emulsion polymerization, frothing agents in the manufacture of gypsum board and for cleaning metal surfaces. They are easy to handle, and store, economical to use.



OLEFINS The olefins are reactive in many ways. These unsaturated hydrocarbons may be used in making rubber antioxidants which inhibit the dangerous drying-out effects of tire sidewalls caused by oxidation. They help stabilize rubber against degradation due to heat and light; assist in the synthesis of rubber accelerators which promote faster curing of rubber. Other uses: heavy-duty varnishes, germicides, insecticides, surface-active agents and dyes.



DETERGENT ALKYLATES This basic raw material plays an important and versatile role in the family of quality Atlantic Petrochemicals. It is used in the production of alkyl aryl sulfonate detergents or surface-active agents. Offered principally as a basic detergent raw material, it is produced in volume quantities in Atlantic's vast facilities. These detergent alkylates can be shipped quickly to volume consumers in bulk or in other units that may be desired.

Philadelphia • Providence • Charlotte
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In Canada: Naugatuck Chemicals Division of Dominion Rubber Co., Ltd.

In Europe: Atlantic Chemicals SAB, Antwerp, Belgium

In South America: Atlantic Refining Company of Brazil, Rio de Janeiro

ATLANTIC PETROLEUM CHEMICALS

THE ATLANTIC REFINING COMPANY

Hot caustic can't foil this coating

A Glidden NU-PON COTE system was applied to foil and immersed in boiling 60% sodium hydroxide. The foil dissolved completely in a short time. The chemical resistant film was unharmed—and stayed that way!

Glidden coatings must submit to a whole battery of grueling tests such as this, because Glidden experts have to be sure before they recommend a protective system.

Glidden Protective Maintenance systems are designed to keep ships, marine installations, petroleum equipment, chemical plants, railroad rolling stock and industrial properties on the job under highly corrosive conditions.

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COATINGS FOR EVERY PURPOSE

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Write for your free copy of booklet containing complete information on all Glidden Protective Maintenance coatings.

Small Business Administration Research and Development Pools	
MEMBERS	Companies in separate fields that require a broader base for effective research Companies in related fields that are too small to do effective research work alone
PURPOSES	Build, equip and supply research facilities Perform proprietary or contract research Obtain patent protection and negotiate licenses
REQUIREMENTS	Open to new members Allow members to drop out Allow members to solicit and perform similar work independently of pool
SBA ASSISTANCE	Obtain immunity from federal antitrust laws and Federal Trade Commission Act List pool with major government procurement offices Help obtain subcontracting work from government prime contractors Issue certificates of technical and business competency Aid in financing of pool Give advice, literature and data on relevant patents and technology Give advice and literature of good management practice

Contract Seekers Band for Big Game Hunt

A group of small research-oriented firms in the New York area are currently seeking government approval to pool their resources, go after bigger and more diversified private and government contracts than any one of them could handle alone.

Similar pools have already been set up in Denver and Albuquerque, and negotiations for setting up several others reportedly are under way.

This firm, though scattered, trend toward research pooling stems from a little-known provision of the Small Business Administration Act as amended in '58. According to this provision, SBA may foster pools for research and development or production or both. Chief advantage of SBA authorization is immunity from federal antitrust laws and the Federal Trade Commission Act. In addition SBA lists the pool with all major government procurement offices and can grant it loans and other types of business and technical assistance (*above*).

Pioneer: If approved, the New York group—called New York Research and Development (NYRAD) Team—would be the first in the area. It would also be the first pool of this type in the U. S. interested exclusively in research. Headquarters are at 150 Broadway at the offices of Manhattan Physical Research Group, Inc., a physics research firm and one of the members of the proposed pool. Manhattan's Cyrus Adler is president of NYRAD.

Other core members of NYRAD are New York Testing Laboratories, environmental and electronic testing labs; Radiation Research Corp., chemical and radiation research and equipment manufacturer; Computech Corp., data processing and systems engineering (all of New York); and Aerolite Corp. (Union, N.J.), electronic component development and manufacturing. And Adler tells CHEMICAL WEEK that at least a dozen others have expressed interest in joining.

Main function of the pool would be to represent its members in bidding for contracts and to funnel work obtained to the companies most capable of performing it. The pool itself would operate as a nonprofit organization (not required by law), retaining only as much of the fees received as would be required for operating expenses.

Western Activity: The only two

Where Pools Fit into SBA Financing Options for Research

Loan plan	Who's eligible	Purposes	Limit	Interest rate and maturity
Regular business	Small businesses	Construction, expansion, purchase of equipment and supplies, working capital	$350,000	5½%, 10 years (6 years for working capital)
Research and development pool	Pools formed by small businesses under SBA auspices to perform research and development	Construction, equipment, supplies, capital needed to benefit from invention	$250,000 per member company in pool	5%, 10 years (20 years for construction)
Small business investment company	Company licensed by SBA to finance small businesses	Capital for lending to small businesses	$150,000 (50% of initial capitalization) or 50% of paid-in capital and surplus	5%, 20 years
State and local development companies	State or local development companies authorized to aid small businesses	Real estate, construction, expansion, equity capital for lending to small businesses	$250,000 per business to be aided	5-5½%, 10-20 years

existing SBA R&D pools are in the West: SPEC Products (Denver), formed in Sept. '59, and Applied Research Associates, Inc. (Albuquerque), set up in Nov. '59. Both pools, however, combine R&D and production—rather than concentrating entirely on R&D.

SPEC was formed to get defense contracts in the missile, aircraft and ground-support equipment areas. Members are Physics, Engineering & Chemical Corp. (Boulder, Colo.), an R&D firm; The McPherson Corp., producer and heat-treater of nonferrous castings; and B. K. Sweeney Mfg. Co., developer and manufacturer of special tools and equipment (both of Denver).

Applied Research Associates was organized to get contracts for R&D in the aircraft and related industries and for preparation of training materials, films, exhibits and reports. Members are Machine Engineering Corp., custom manufacturer of machined parts, steel fabrications and assemblies; AVC, Inc., consulting engineering firm specializing in graphic presentations; Bandelier Films, Inc., motion picture producer; and Ward Anderson Printing Co., Inc., job printer (all of Albuquerque). SBA reports that these pools have yet to get their first contract.

Multipurpose Pools: SBA pools can be set up to serve various purposes. Basically, the need for pooling is due to members' small size, which limits their capacity and narrows their range of capabilities.

By pooling resources, small firms in dissimilar fields can trade know-how and background that may be useful in a number of industries. Moreover, they can contribute different aspects of knowledge to a broad research problem that none of them could undertake alone. And even companies in related fields could benefit from pooling their capacities, enabling them to go after larger contracts.

In addition to performing and exchanging information on proprietary or contract research, the pool can also centralize work on building, equipping and supplying R&D facilities. Patents and licenses constitute another important area that can be handled through a pool.

To gain SBA approval the pool must conform to a few restrictions. For one thing it must be open to new members. Not all applicants must be accepted, but reasons for rejecting a firm must be submitted to SBA. On the other hand, members of the pool must always have the option of dropping out, after completing any outstanding obligations. And members must also be allowed to solicit and perform work independently of the pool.

Lending a Hand: Since exempting small business pools from antitrust laws and FTC jurisdiction does not, of course, guarantee their success, SBA offers several other encouragements to the fledgling groups. A key service is the listing of the new organization with major government purchasing offices. On the local level it can also aid in obtaining subcontracting work from prime contractors on government projects.

Another SBA service is the certificate of competency. SBA issues such certificates when a company with a particular area of technical competence requests help in documenting this to prospective clients.

In addition SBA stands ready to supply pools with technical and management advice in the form of literature, consultation and data.

Pools can also be a favorable way for firms to borrow from SBA, compared with other methods (*above*). Direct SBA loans are limited to $350,000 per company and carry an interest rate of 5½%. R&D pools, however, can borrow up to $250,000, times the number of member companies, at a rate of 5%. Individual companies could also borrow indirectly from SBA through small business investment companies or state or local development companies. However, these groups are themselves paying 5-5½% interest, would obviously have to charge more or require equity in the company.

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JEFFERSON CHEMICALS

014

Chemical Healers

A clutch of new compounds are bidding for therapeutic duties this week. And some older drugs were reported as having new uses.

A potent, orally administered diuretic named Metahydrin (trichloromethiazide) is now being offered by Lakeside Laboratories, Inc. (Milwaukee). Chemically, it is 3-dichloromethyl - 6 - chloro-7-sulfamyl-3,4 - dihydro - 1,2,4 - benzothiadiazine - 1,1 - dioxide. Lakeside says the compound, when tested for the control of edema and hypertension, displayed a potency 100 to 200 times that of widely used chlorothiazide and 10 to 20 times that of hydrochlorothiazide.

Newly reported clinical studies of a drug launched last December show it is effective against angina pectoris in 75% of cases. Isordil (isosorbide dinitrate), developed by Ives-Cameron (New York) division of American Home Products, compared favorably with pentaerythritol tetranitrate (PETN), erythrol tetranitrate, PETN combinations (sedatives, tranquilizers, antihypertensives), dioxylene phosphate, triethanolamine trinitrate biphosphate, and papaverine. Baylor University cardiologist Robert Leslie reported on the drug at the sixteenth annual scientific meeting of the Michigan Academy of General Practice at the Sheraton-Cadillac Hotel in Detroit.

Urea is enjoying resurgence in the medical field, an Abbott Laboratories (North Chicago) spokesman tells CHEMICAL WEEK. It has been found useful in brain surgery and also in reducing interocular tension.

A newly discovered group of drugs obtainable from bulbs of certain spring flowers (e.g., daffodils) offer a potential aid in treating myasthenia

Converted castle, viewed from adjacent 25-acre park, houses research labs and library.

Baronial Setting for Royal Dutch Research

When Royal Dutch Shell subsidiary Deutsche Shell (Hamburg, Germany) needed a new research laboratory, it set one up in a castle (above). The lab, named Shell-Grundlagenforschung Gesellschaft, occupies the 60-year-old castle Schloss Birlinghoven, tucked away in a forest six miles from Bonn.

Converted at a cost of $3 million, the castle retains its winding stairs and picturesque halls, but now contains 15 separate labs for basic chemical research. Its equipment includes a nuclear magnetic resonance spectrometer, gas chromatography apparatus, and similar expensive units.

Directing the lab's 90 staffers is 37-year-old Friedhelm Korte. Korte is an expert on the use of tracers in metabolism studies (e.g., of the B vitamins), also helped discover iridomyrmecine, an insecticide and bacteriostat obtained from a tropical ant.

Korte tells CHEMICAL WEEK he picked the site largely because of its freedom from noise. He feels the location is ideal for "independent scientific work," encourages fellow workers (there are no subordinates at Birlinghoven, according to Korte). What counts is "the single human being's having important ideas," he says. "Everything must be done to make my colleagues free from work that can be carried out by machines or less qualified personnel."

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For additional information on handling properties, copolymerization procedures, etc., write for Bulletin No. AP-86.

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gravis, a puzzling neuromuscular disease.

According to National Institutes of Health scientists, NIH work was stimulated by a Russian report that one such drug, called galanthamine hydrobromide, was effective against neuromuscular disorders. While the compound has proved less effective than certain other conventional drugs for this purpose, NIH isolated others (related to a substance called lycoramine) that appear more promising.

Resinless Bark Board

Oregon Forest Research Center (Corvallis, Ore.) at Oregon State College reports it has successfully produced bark board made from bark of Douglas fir and ponderosa pine without addition of resin for bonding. Under proper conditions of heat and pressure, natural substances in the bark reportedly react to form a bond. Result: board similar to wood particle board and hardboard.

The development could have an effect on CPI sources supplying resins for particle board. Resins for bonding are responsible for nearly half the costs of manufacturing particle board, according to OFRC. The bark-into-board study results from a project to seek a possible market for more than 1 million tons of Douglas fir bark burned annually in Oregon as mill residue.

Magnetic Opportunist

Chromium manganese antimonide, newly developed by Du Pont researchers, is reversibly magnetic. It becomes magnetic at 250 C, nonmagnetic below that temperature. By slight changes in composition, this critical temperature can be varied over a wide range.

Du Pont doesn't disclose potential applications, points out that it doesn't know where this "new knowledge" may lead.

Most magnetic materials lose magnetism gradually as temperature increases (e.g., iron becomes nonmagnetic at 1420 F). The new compound is different, Du Pont explains, because the distance between its atoms determines how the inner magnetic forces are lined up. When the distance is less than a specific length, the

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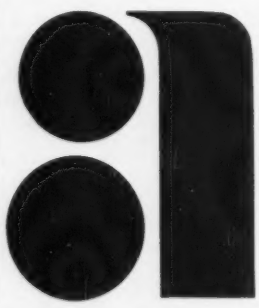
PROPERTY DATA

MOLECULAR WEIGHT . . . 64.06
SPECIFIC GRAVITY
Liquid: Water = 1 @ 0°C (32°F) . . . 1.434
Gas: Air = 1 @ 0°C & 760 mm . . . 2.2636
MELTING POINT . . (—103.9°F) . . —75.5°C
BOILING POINT . . . (14°F) . . . —10.0°C
REFRACTIVE INDEX
Liquid: (I.C.T. 1,107) . . n20°/D(68°F) . . 1.410
Gas: (Mellor, J. W. Vol. X, 197) . . . n15°/D (59°F) . . . 1.000686



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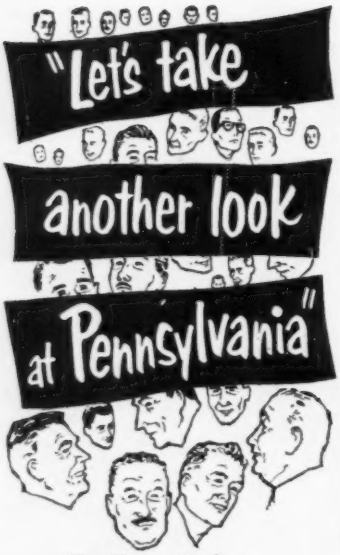

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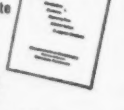

Pennsylvania Department of Commerce
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forces are aligned in a nonmagnetic pattern; when it is longer, they swing into a magnetic pattern. The compound contracts and expands as other substances do, and its range of contraction includes the dimension at which the magnetic forces shift. Consequently, raising or lowering the temperature brings about the change in magnetic properties.

Hot-Spot Ceramics

A pair of new ceramic materials are in the spotlight this week. Both are specially resistant to high temperatures. (*For another ceramic development, see p. 78.*)

Coors Porcelain Co. (Golden, Colo.) has developed a high-strength, vacuum-tight 99.5% aluminum oxide ceramic that can be used at temperatures up to 1760 C. It's called Type AD-995, has exceptional dielectric characteristics and is highly resistant to abrasion and corrosion. Coors believes the new material will be useful in the electric and electronics industries.

Duramic Products, Inc. (Palisades Park, N.J.), is offering a low-alumina ceramic composition, called HT-2, that it is making for semiconductor diffusion processing at temperatures up to 1300 C. The company uses the material to make boats for holding silicon and germanium crystals as they are passed through diffusion ovens for doping. Boats made of the new ceramic are said to have much longer lives than those made of quartz or other conventional materials.

Space Engine Record

This week General Electric's Missile and Space Vehicle Dept. (Philadelphia) is claiming the longest consecutive firing record for plasma accelerators. GE's Repetitively Pulsed Plasma Accelerator (REPPAC I) has been fired continuously for 18½ hours; nearly 4 million individual firings at the rate of 3,000/minute. Total thrust would have stabilized a space vehicle for two years, GE believes.

The REPPAC utilizes a T-shaped tube open to a vacuum having electrodes at opposite ends. Measured amounts of gas are automatically injected into the tube. Electric current ionizes the gas, causing it to conduct

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n-butyric anhydride
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crotonic acid
A versatile and reactive intermediate

For properties and shipping information on these and other Eastman products, see **Chemical Materials Catalog**, page 363 or **Chemical Week Buyers' Guide**, page 107.

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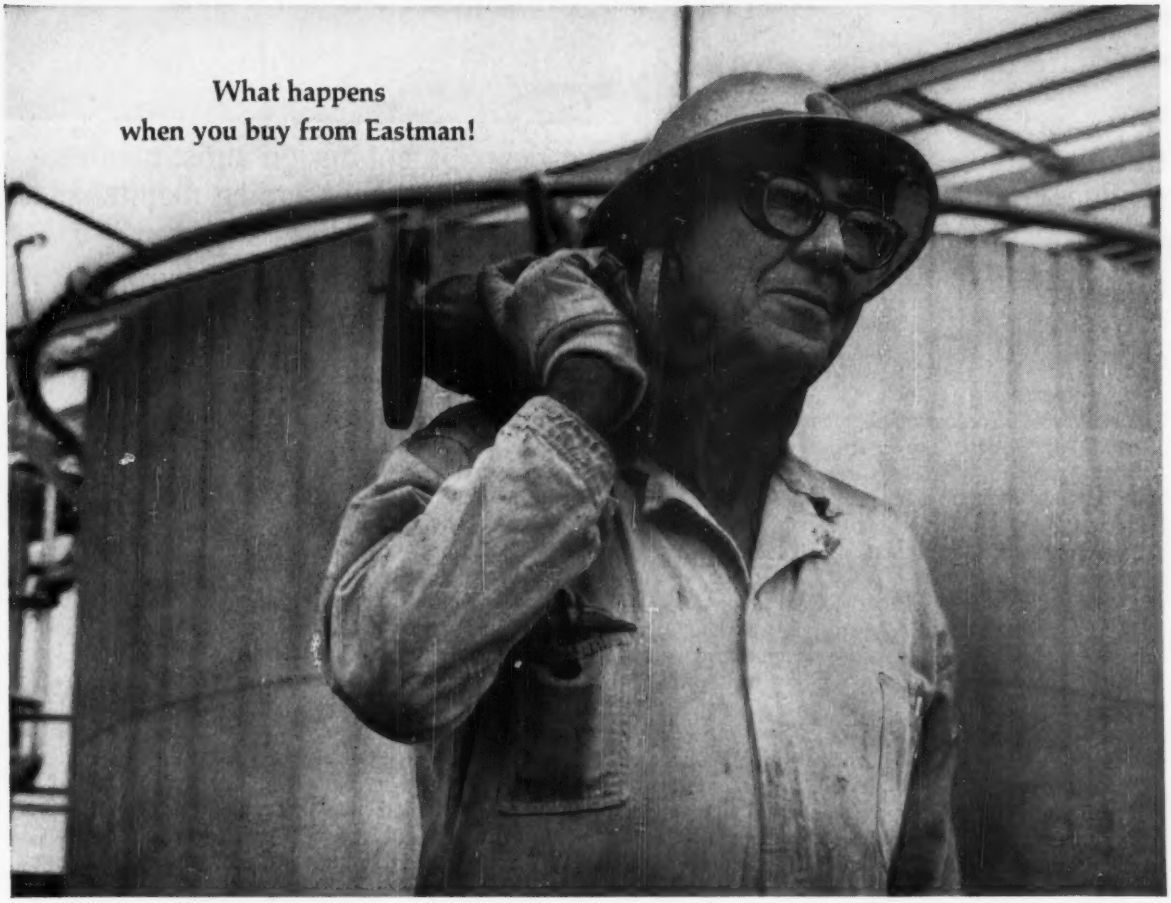

The case of the culprit catalyst

"The phone was ringing when I walked into the office on that Monday morning," mused one of our regional sales managers.

"The customer's greeting was rather cheerful considering the circumstances he then proceeded to relate.

"In his own words it went something like this: 'We have a new process technique out here, but we're not overly proud of it. We're making aluminum acetate...using as reactants *your glacial acetic acid* and one of our new aluminum storage tanks.'

"I was glad he still had a sense of humor but wished that I had taken the day's vacation, which was briefly considered late Sunday.

"Well, he went on to relate that their yields on a process (not the new one he had just mentioned) in which our acetic acid was one of the reactants had dropped off alarmingly. While checking out process controls and materials they found aluminum acetate in the acetic acid storage tank.

"Under the circumstances his conclusion that our acid contained a catalyst for the unwanted reaction seemed even to me a reasonable hypothesis.

"Arrangements were made to send a large sample to our Acid Division Control Laboratories for complete analysis, and I held my breath several days until the final report came in.

"A metal catalyst was present, but one that for a number of good reasons we avoid like the plague. Armed with the information that it was extremely unlikely that contamination occurred prior to unloading, we dispatched a technical service man to the customer's plant to help find out where it was coming from.

"And with the aid of an improperly functioning check valve, he did. Seems that the acetic acid storage tank was connected directly to a reactor in which the metal catalyst was (as it should have been) present in salt form. Trace amounts were reaching the storage tank...and you know the rest.

"Fortunately, tank damage was not extensive, and by filtering, they were able to make use of the acid containing the aluminum acetate. After cleaning out the tank it was filled back up... with a new supply of our pure glacial acetic acid.

"Oh yes, a brand new check valve was installed, too."

The normal way we keep our customers happy? If necessary, yes. But more an example of the interested personal service you get when you buy from Eastman.

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See why ALCOA ALUMINUM makes good designs better

Requirement: achieve these major process equipment design aims: minimize product contamination . . . lengthen equipment life without adding maintenance costs . . . keep first cost down.

Key to Good Design: Alcoa Aluminum to eliminate contaminants, improve corrosion resistance, deliver strength without extra weight for design economies—at low first cost.

The evolution of process equipment design has developed a significant trend toward the use of aluminum—Alcoa® Aluminum—to satisfy increasingly stringent requirements of modern processing. At the base of this trend has been one factor: a growing awareness that aluminum provides a combination of chemical and physical properties perfectly suited to the needs of a particular process and the equipment which contains it.

Take, for example, the needs of a low pressure polyethylene process such as the one diagrammed below. The primary need here is for equipment which will not impart contaminants which discolor the product. The obvious design answer is aluminum with its demonstrated ability to prevent such contamination. Add to this such other important aluminum design benefits as these:

It provides a level of corrosion resistance unique among commonly used metals; its low temperature properties are outstanding (tensile and yield strengths actually increase without embrittlement as operating temperatures drop); it is nontoxic; its strength-weight ratio surpasses that of nearly every other metal; and its first cost is far lower than that of other suitable materials.

To take advantage of this unusual range of characteristics, designers and builders of polyolefin plants have employed Alcoa Aluminum in such varied equipment applications as heat exchangers, dryers, cyclone bins, cube storage bins, piping and a host of others.

And polyethylene represents just one of literally hundreds of processes in which aluminum provides important design benefits on equipment applications of nearly every type. A few of these are shown on the opposite page. In nearly every case, aluminum's benefits can be predicted with surprising accuracy—thanks to the large volume of factual service data developed by Alcoa in well over 40 years of applying aluminum to process equipment requirements. Alcoa engineers are anxious to share this experience with you. They are doing so through a series of engineering conferences being held this year in major cities throughout the country. Your local Alcoa sales office will furnish you with details.

Examine the large body of Alcoa technical literature which describes in detail the proven performance characteristics of aluminum in a variety of process industries uses. Simply fill in and mail the coupon opposite.

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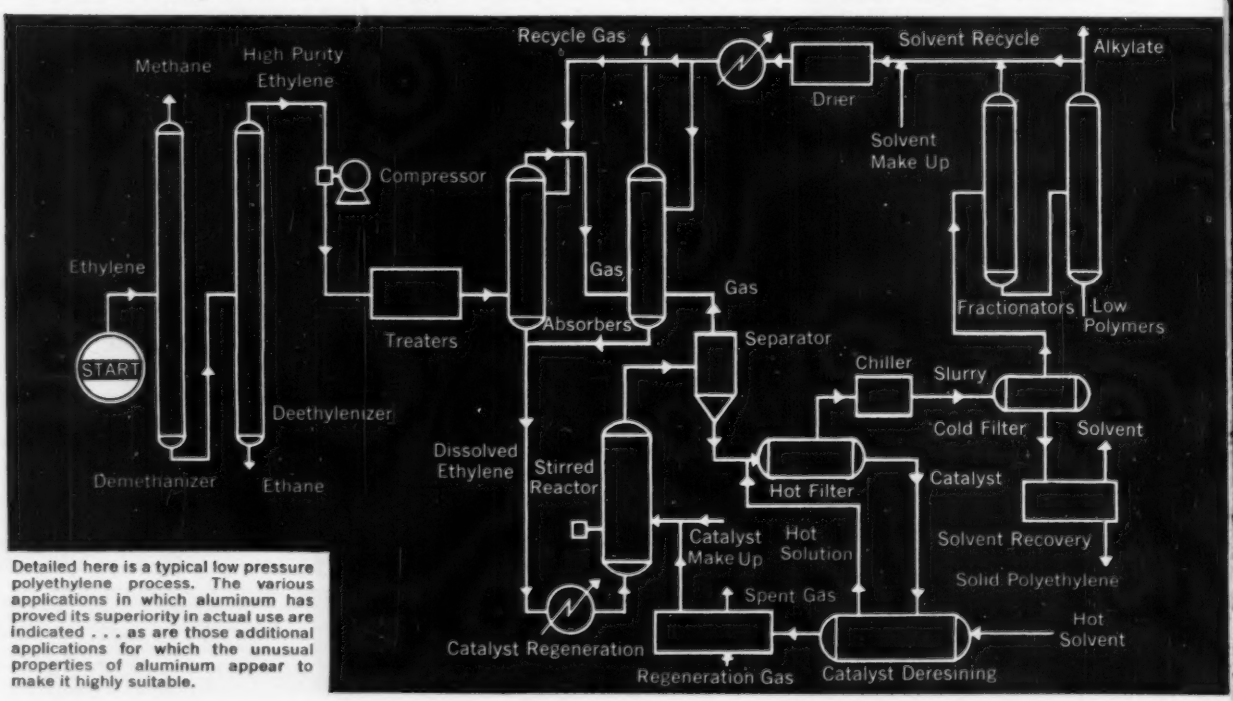
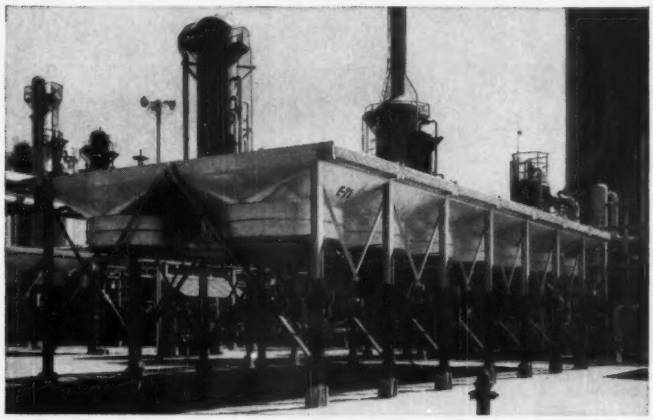
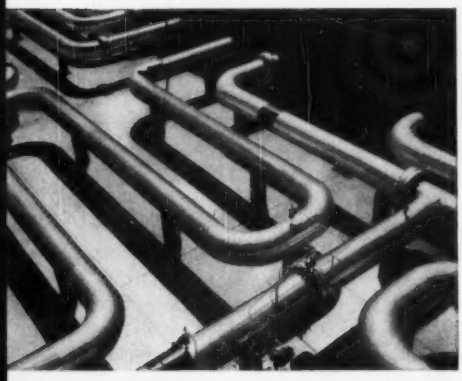


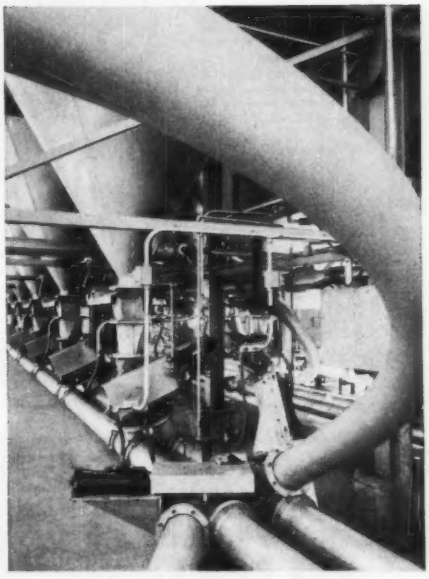
Detailed here is a typical low pressure polyethylene process. The various applications in which aluminum has proved its superiority in actual use are indicated . . . as are those additional applications for which the unusual properties of aluminum appear to make it highly suitable.



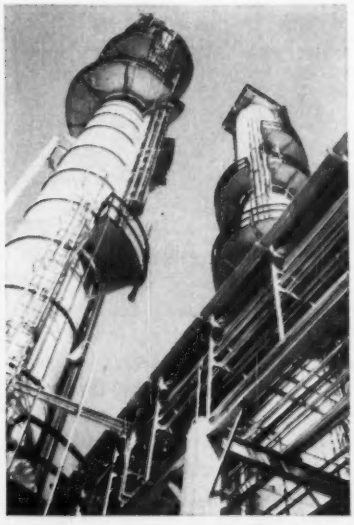
Below, aluminum's ability to maintain its serviceability and excellent appearance in chemically contaminated atmospheres is utilized here in Al-Cor-Jac alclad aluminum jacketing—manufactured by Insul-Coustic Corporation, Maspeth, Long Island, N.Y.



Pictured above is a Solo-aire cooling unit manufactured by Hudson Engineering Corporation, Houston, Texas. Here the excellent heat transfer properties of aluminum made it a] natural choice for process cooling. Of important added value are the excellent corrosion resistance of aluminum and its outstanding low temperature properties.



Right, this polyethylene process employs a variety of aluminum applications to prevent product discoloration. Since the process operates at extremely low temperatures, aluminum's excellent low temperature durability is an important asset in piping, bins, hoppers and vessels.



These prilling towers and nearly all of the piping and equipment surrounding them are aluminum. Selection of Alcoa Aluminum was based upon the metal's unique ability to withstand corrosive attack in this nitrogen fertilizer operation — plus its excellent strength-weight ratio which contributes to economical design by eliminating the need for excessive structural support.

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- ☐ 10418 Alcoa Unitrace: Combines Piping and Tracing in One Unit
- ☐ 514 Alcoa Duotrace Technical Report
- ☐ 10270 Alcoa Utilitube
- ☐ 10460 Process Industries Applications of Alcoa Aluminum
- ☐ 11453 Solving Refinery Corrosion Problems with Aluminum
- ☐ 20849 Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres
- ☐ 20437 Aluminum Alloy Heat Exchangers in the Process Industries
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current between the electrodes. The resultant plasma jet is magnetically accelerated into an evacuated chamber, producing thrust. This thrust amounted to about 0.1 oz. per firing with the GE accelerator.

Polaris Progress

A new second-stage rocket motor was unveiled last week in a test firing of a Navy Polaris missile. The motor increases range and payload capabilities. Designed and produced at Allegany Ballistics Laboratory, a Navy-owned facility operated by Hercules Powder Co., the motor promises to extend the Polaris' range "several hundred miles" according to Hercules. It uses a new type of solid propellant "with a higher specific impulse than any in use to date." A specially designed rocket case is made of Hercules Spiralloy (*CW, Aug. 27, p. 49*), a combination of glass filaments and resin, which Hercules says "gives the highest strength-to-weight ratio of known materials." The advanced A-2 Polaris missile successfully tested is undergoing further development to increase its range.

EXPANSION

- Western Scientific Instrument Co. (Redwood City, Calif.) has opened a "primary standards" laboratory, believed to be the first commercial lab of its kind in northern California. It's for calibration of electrical and electronic instruments used in research and production.
- The Rocket Research Corp. (Seattle, Wash.) is a new firm for high-energy propellant research development and production. It plans to expand into electrical and nuclear propulsion fields.
- Aerojet-General Corp. has dedicated a new $850,000 chemical research center at its Azusa, Calif., plant.
- Bio - Assay Laboratories has started construction of 8,100 sq.ft. of new space for laboratories and offices at Dallas, Tex. The company performs analytical and research tests in chemistry, bacteriology and radioisotopes. Completion is scheduled for early '61.
- Robertshaw-Fulton Controls Co. has opened its new research center at King of Prussia, Pa.

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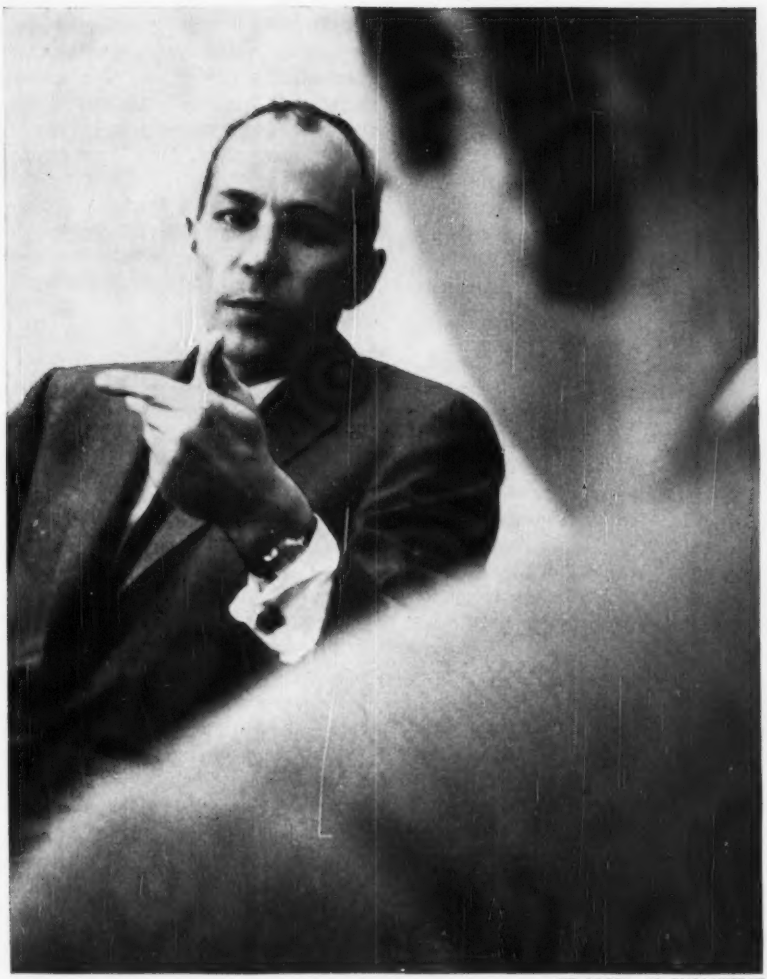

CW PHOTO—ED WALLOWITCH

G. A. Forlenza describes Cyanamid's process evaluation approach.

Canny Process Purchaser

The earnest engineering management man pictured above and his counterparts throughout the chemical process industries will find a personal message between the lines of the just-published statistics on new plant construction for the first 10 months of '60. Compiled by Construction Daily (McGraw-Hill), the data underscore the changing role of the engineering manager—a change forced by the increasing extent to which CPI firms are buying processes.

Of the great bulk of plants contracted during Jan.-Oct. '60, 10% were built by firms licensing the process and 30% by engineering companies with proprietary know-how.

Thus, about 40% of the plants now under construction are using outside engineering developments.

The corresponding figure 15-20 years ago was almost zero; it could double in another 15 years. In 25 years it's likely that a CPI firm would no more think of developing its own processes than it now thinks of developing its own pumps, valves or heat exchangers. (Special situations, as in fields where technology cannot be bought, will provide the only exceptions.)

Today there are just two cases in which it is profitable for a firm to do its own process development:

(1) When the firm already has a strong position in a particular product or field. In this case it would be profitable not only to insure dominance in the processing know-how but also to license some of this information to other producers. Imperial Chemical Industries Ltd. (London) licensed its polyethylene technology to Dow, National Petrochemical, Spencer and Texas Eastman. Phillips Chemical Co. licensed its high-density polyethylene process to Celanese, Union Carbide and W. R. Grace.

(2) When a patent advantage is on the horizon, or when a strong jump on competition is in sight. Small firms often exist simply by exploiting an invention to the hilt.

Spurring the current strong trend to outside services is the high—and climbing—cost of process development. R & D for a typical process eats up at least a half-million dollars. Some processes have cost as much as $15-20 million to develop. Experts agree that duplication of effort wastes much R & D talent and time. For example, now five firms all work out a scheme to make the same product. If one firm did the engineering and licensed out the process, the total expenditure for development work could be cut by four-fifths.

Usually a producing firm won't license its process know-how if it is the only one able to make a certain product. But process design firms such as Scientific Design Co., Inc. (New York) do this all the time. Thus SD, along with a few similar firms, does the job that firms such as Universal Oil Products perform for the oil industry—supply processes to producing firms.

Making the Choice: How does a large firm select a process? At American Cyanamid, much of the responsibility rests with G. A. Forlenza, general manager of engineering and construction.

His work begins when a market research group or top management earmarks a product as a potential profitmaker—a product whose process is new to Cyanamid. After this commercial justification, Forlenza comes into the picture to find the process that will give the lowest unit cost of production.

His first step is to find out who is

willing to license processes. Nowadays, this is becoming easier, as more and more firms are willing to license, for certain products, all or part of their process know-how.

If a process design firm happens to license a process, Forlenza swings it into focus. The evaluation gets under way as nondisclosure, or secrecy, agreements are signed: the security that no word shall leak beyond the inquiring firm is a must before the potential licensor divulges proprietary information.

The complexity of this evaluation will depend, in part, upon whether information comes from a process design firm or another operating firm. The former will submit investment and operating-cost estimates scaled directly to the desired capacity, but Forlenza's process-evaluation team will have to juggle data that come from another producer. When the know-how is licensed from a producer, a third party is often called into the negotiations to do the actual design and construction. The role of this party varies according to the amount of detailed information supplied by the licensing firm.

Throughout the process evaluation, it is usually easier to deal with a process design firm. These engineering companies are geared to tailor estimates and designs to specific needs, since such work is their prime business —not a sideline.

In some cases, a quick look at a process shows that it simply does not fit the requirements—raw materials or by-products are undesirable or the investment costs are out of line. However, the evaluation usually continues for some time—three weeks or as long as many months—before a process is irrevocably turned down. Meanwhile, Cyanamid's evaluation group is piling up salary and other expenses, so that a study may cost from $5,000 to $20,000 or more.

Details: Many factors involved in an evaluation are sometimes intangible: First and foremost, how well does the process work? How long will it take to build a plant and start it up? What are operating labor and utility requirements? Other factors: maintenance, possible obsolescence, etc.

Cyanamid feels that this evaluation insures the most for its money.

But Cyanamid has an engineering and construction division with 250 men, servicing all company plants and processes. Smaller firms can't carry such a large staff. Nopco Chemical Co. (Newark, N.J.)—with annual sales of $40 million vs. Cyanamid's $600 million—has a process evaluation department of six men doing essentially the same job as the large firms.

Relatively small firms have to rely on engineering firms—a trust that proves worthy in almost all cases. Dixon Chemical Industries (Paulsboro, N.J.) and Border Chemical Co. (Winnipeg, Canada) are two firms that relied on Chemical Construction Co. (New York) for their projects.

This reliance on design engineering firms is well justified. These firms have been booming in recent years, and this growth is based entirely on how well they can be trusted to build plants and keep them running.

All the Money: A problem arises when a firm is already incurring development expense for a competitive process. How does it handle the research and development expense on its own process when it considers an outside process?

Suppose a firm gets part-way through with its own process and an opportunity arises to license an outside process. The company is likely to compare the investment cost estimated by the engineering firm against its own estimated investment cost— capital cost vs. capital cost, or amortization vs. amortization. But in drawing up the figure for investment on its own process, often no weight is given to the R & D expense which has been incurred.

This problem boils down to accounting procedures; and the newest cash-flow systems were developed to account for just such inconsistencies. But some years will elapse before all companies erase this problem, giving fair weight to the value of an outside process, by crediting it as a research and development achievement.

Economics: Once all factors have been set down in numerical form, the process with the lowest unit cost can be chosen. The actual investment and operating figures, along with the peripheral intangibles—sometimes not so peripheral but very significant—are drawn up and turned over for decision to a commercial analysis committee, a top-management function.

Today two-fifths of the decisions are for processes developed outside management's own laboratories, for the over-all outlay of money is often lower and the process works as soon as the plant is built. Another advantage of the outside process is the ease of costing a new plant. One investment sum can easily be quoted for established systems—e.g., ammonia or sulfuric acid plant. Or a licensee may prefer to pay costs incurred by the outside firm, plus a fixed fee. Either way, the chemical producer knows the cost of a process; development money can be spent on new processes for new products.

British Invasion

Coming onstream this month is British Petroleum's first refinery in the Western Hemisphere. Located on a 250-acre site 12 miles east of Montreal, the new refinery processes 25,000 bbls./day of crude. Products are designed especially for the Canadian market.

Output will include gasoline (12,000 bbls./day), low-pour-point fuel oils, bunker fuel oil, diesel fuel, and bottled propane and butane gas. Jet fuel will be brought onstream later.

The plant has several novel features. It is unusually compact, with the major processing units on either side of one overhead pipe rack. It is completely controlled electronically from one master control room. And it has a supplementary feed from the Portland-Montreal pipeline, which delivers crude oil to the refinery when ice prevents tankers from coming up the St. Lawrence River.

Completed on schedule, the refinery was planned in two stages. First, British Petroleum engineers designed a 780-ft.-long wharf on the St. Lawrence to handle 28,000-ton tankers, a tank farm for 931,000 bbls. of finished products, and a 3½-mile-long interconnecting pipeline system. Then Lummus Co. Ltd., the prime contractor, designed and constructed an additional 2.5 million bbls. of tankage capacity and the process units.

Processing units include crude oil atmospheric and vacuum distillation, a distillate hydrotreater, a catalytic cracker, a catalytic polymerization unit, and a catalytic reformer. Products from these units will be marketed through a Montreal terminal owned and operated by BP Canada Ltd., which is separate from the refinery.

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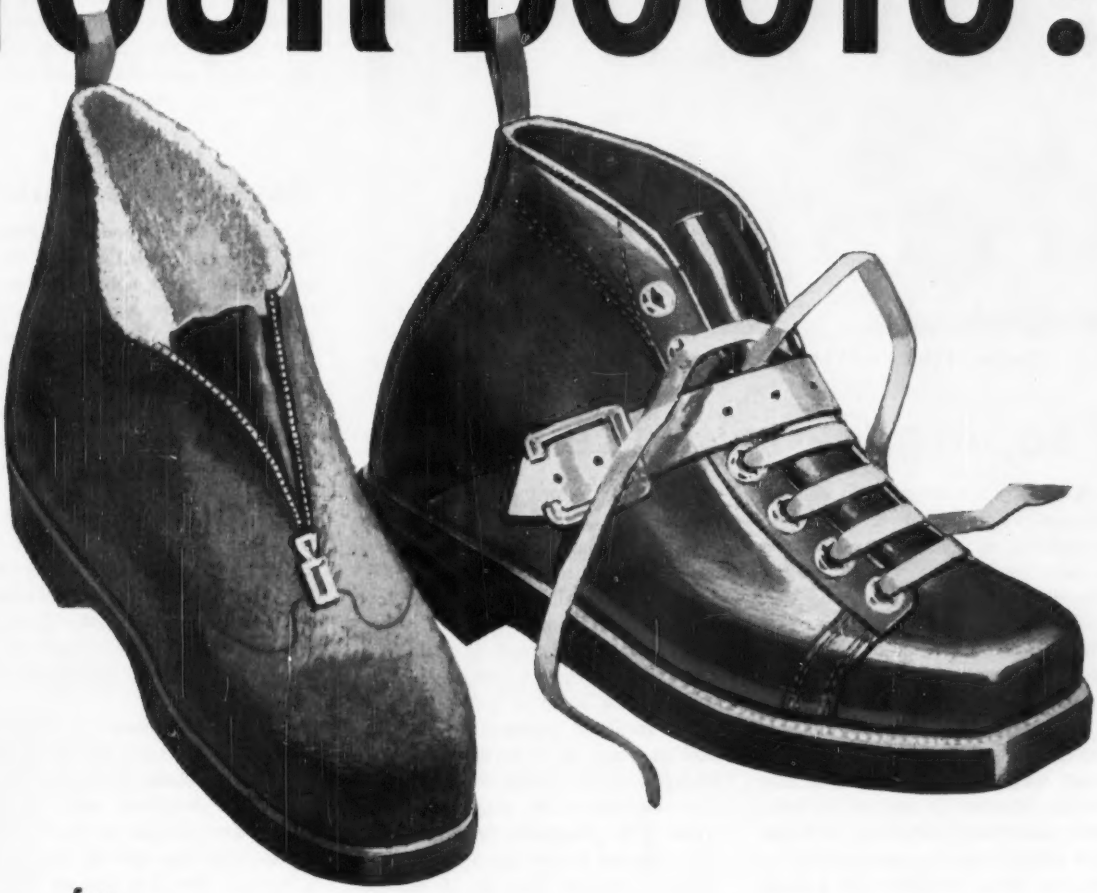

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W-L's Wellman (left) and Lord reap contracts from phosphate boom.

Keeping Close to the Source

Is there much to gain in being a regional chemical plant contractor, specializing in the few key processes an area can use? Wellman-Lord Engineering, Inc., of Lakeland, Fla., thinks there is—and its nearly $13-million worth of business this year (after just five years of CPI concentration) pretty well proves its point.

Moreover, new contracts indicate that its '61 building program is off to a fast start: (1) the firm has a new Florida customer in one of its basic fields, phosphate production; (2) it has gone afield, landed a contract with a Western copper producer for a flotation unit—both plants will use W-L's exclusively licensed Smith-Douglass-Hollingsworth-Sapp flotation process (*CW, Sept. 24, p. 75*); (3) it is expanding phosphoric acid facilities of Davison Chemical Co., near Bartow; (4) it has just signed up to build a multimillion-dollar phosphate calcining plant for Virginia-Carolina Chemical Corp.

All this activity stems from an idea partners Jim Wellman and Bill Lord came up with nine years ago: to provide Polk County, Florida, which has the world's heaviest concentration of phosphate deposits and phosphate producers, with a design and engineering company specializing in this business. Previously, contractors had not concentrated on phosphate. So Wellman and Lord stopped building houses, began industrial construction —of phosphate plants. After five years business income was $643,000, rose to $4.1 million in '59, is now about $14 million.

Although this growth came in part from work outside the state, the firm is riding the boom of Florida's phosphate fertilizer industry. About $35 million worth of construction is now under way to expand Florida's fertilizer facilities (*CW, Aug. 27, p. 69*). Total U.S. phosphate fertilizer sales are expected to rise from about 14.7 million tons this year to 18 million tons 10 years from now (*CW, Oct. 15, p. 20*).

Wellman-Lord expects to move right along with this increase in phosphate and fertilizer activity, although it does get into related fields. For example, W-L took on a contract to redo W. R. Grace's Puerto Rican sulfuric acid plant, where air pollution—as in phosphate plants—is an operating problem.

But W-L pays almost complete attention to phosphate technology. That way it has been able to develop a highly experienced staff. Professional and clerical employees numbered 550 seven months ago; now the roster is 800. Of these, about 100 are engineers and draftsmen.

The manpower increase forced a doubling of W-L's company headquarters in Sept. '59, but further expansion is needed now. Management looks for $20 million worth of work next year.

Much of this business will come from former customers such as Kaiser Aluminum, International Minerals & Chemical, and Davison. But phosphates are ever-climbing. New firms may get into the picture. And Wellman-Lord's specialized setup is ready to build the plants, build an even bigger reputation for itself.

Moving to the Market

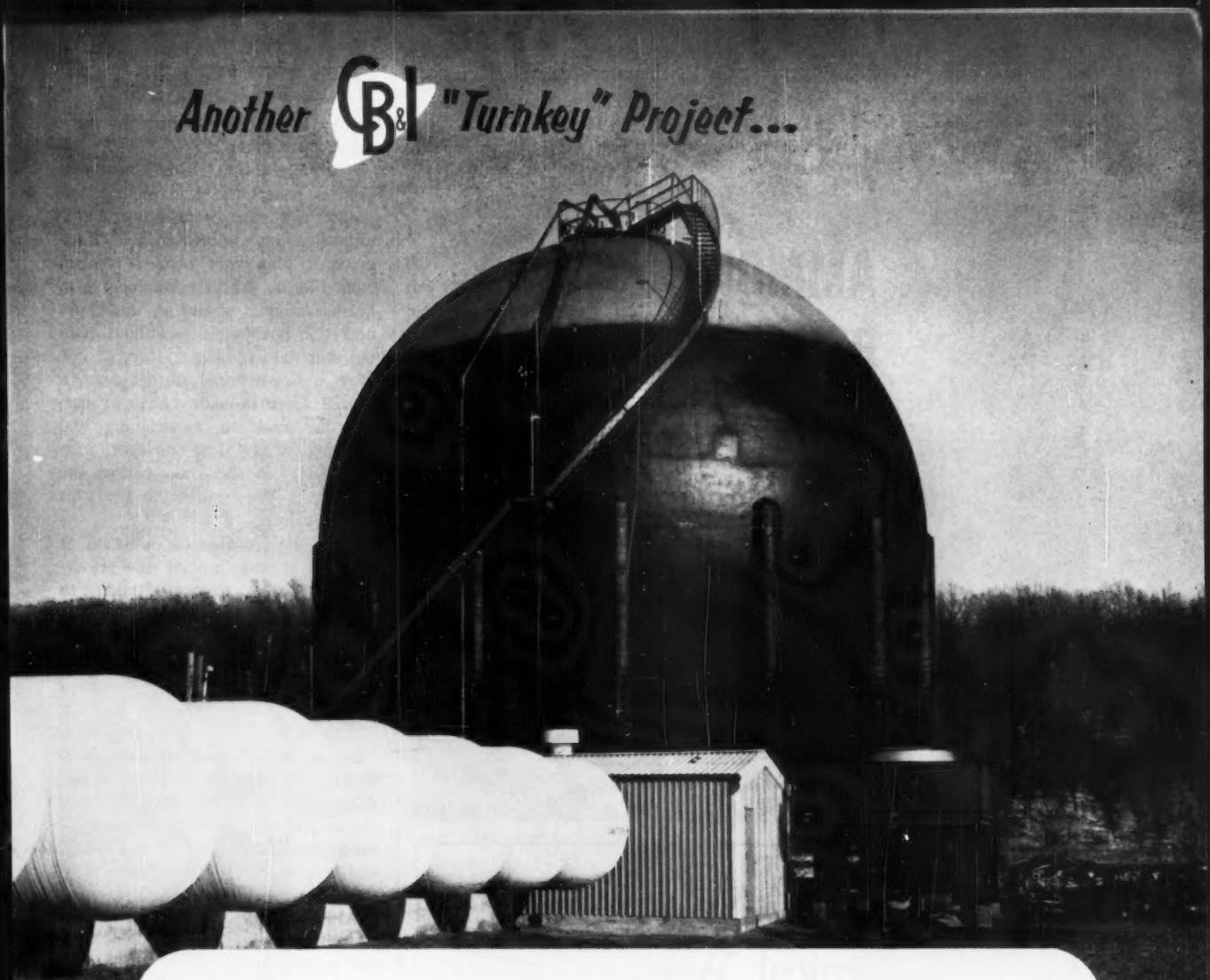
A newly formed company, National Phosphate Corp. (Marseilles, Ill.), is putting its weight behind a new concept—it's building a wet-process phosphoric acid plant in the Midwest, far from Florida (see story at left), source of phosphate rock. Aim: to make acid right where acid is used by the major fertilizer producers. Cornerstone of the plan is automatic handling of barged-in rock.

It is still too early to prove the economics of this idea, but at least two other acid makers have similarly bet that it will be more profitable to make acid near the market (and near the fertilizer makers' markets: the farmers) than near the raw-material source.

National is a new company, but President Erol Baker has 20 years of phosphate processing experience, has built four phosphoric acid plants in Europe and Canada for various companies, and more recently has decided to come to the U.S. and try business on his own. He has asked the Chemical Dept. of Empire Trust Co. (New York) to help in the financing.

Chemical Construction Corp. (New York) is designing National's process section, and advising on the whole plant. The plant is slated for completion in only seven or eight months; the contract with Chemico was signed in early June and the plant is due on-stream Jan. 1, '61. That's record time. Plants of this type usually take 12-18 months to build.

And its capacity—100,000 tons/-year (54% phosphoric acid)—is also unusual for the area, although current expansion by two firms, Blockson Chemical (Joliet, Ill.), division of Olin Mathieson, and Allied Chemical's General Chemical Division (East St.



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Louis, Ill.) will put them into the same capacity range.

Nuts and Bolts: Baker's new wet-process phosphoric acid plant incorporates a number of process and material-handling improvements. Raw-material phosphate rock is barged from Florida. And from unloading to finished-product shipment, the entire operation is automatic—without manual material-handling.

At a raw-material storage area, a special German-made conveyor carries the rock to a weighing and grinding facility. This conveyor, relatively new to the U.S., carries the rock up a steep incline to the start of the process.

With its raw material elevated at the start, the wet process uses gravity flow extensively, instead of pumps to move material through several stages. This not only cuts down investment but also eliminates difficult maintenance problems arising from corrosive solutions.

Throughout the processing area, Chemico has designed a closed water system, the first for a plant in the locale. The system takes care of the air-pollution problems that always accompany phosphoric acid making, and it minimizes the need for costly scrubbing.

After the processing section, the phosphoric acid passes through filters and concentrators. A specially designed clarification system continuously cleans the product during storage. This is especially important because the acid solidifies during long-distance shipping. The undesirable buildup of solids is one reason why it's advantageous to build an acid plant near its market. National Phosphate plans to service customers within 300-400 miles of its plant.

This new plant, together with those of Blockson and General Chemical, and a few other Midwestern firms, points up a steady swing in the building of plants away from Florida. Of course, Florida produced 73% of the '59 U.S. phosphate output. But that state's output was 85% of the total in '34. Since '46, Midwestern phosphate production has climbed—from 8% of total output to 15% in '59. If National's phosphate improvements work out, there's good reason to think that the Midwest's share of phosphate fertilizer processing will grow even faster.

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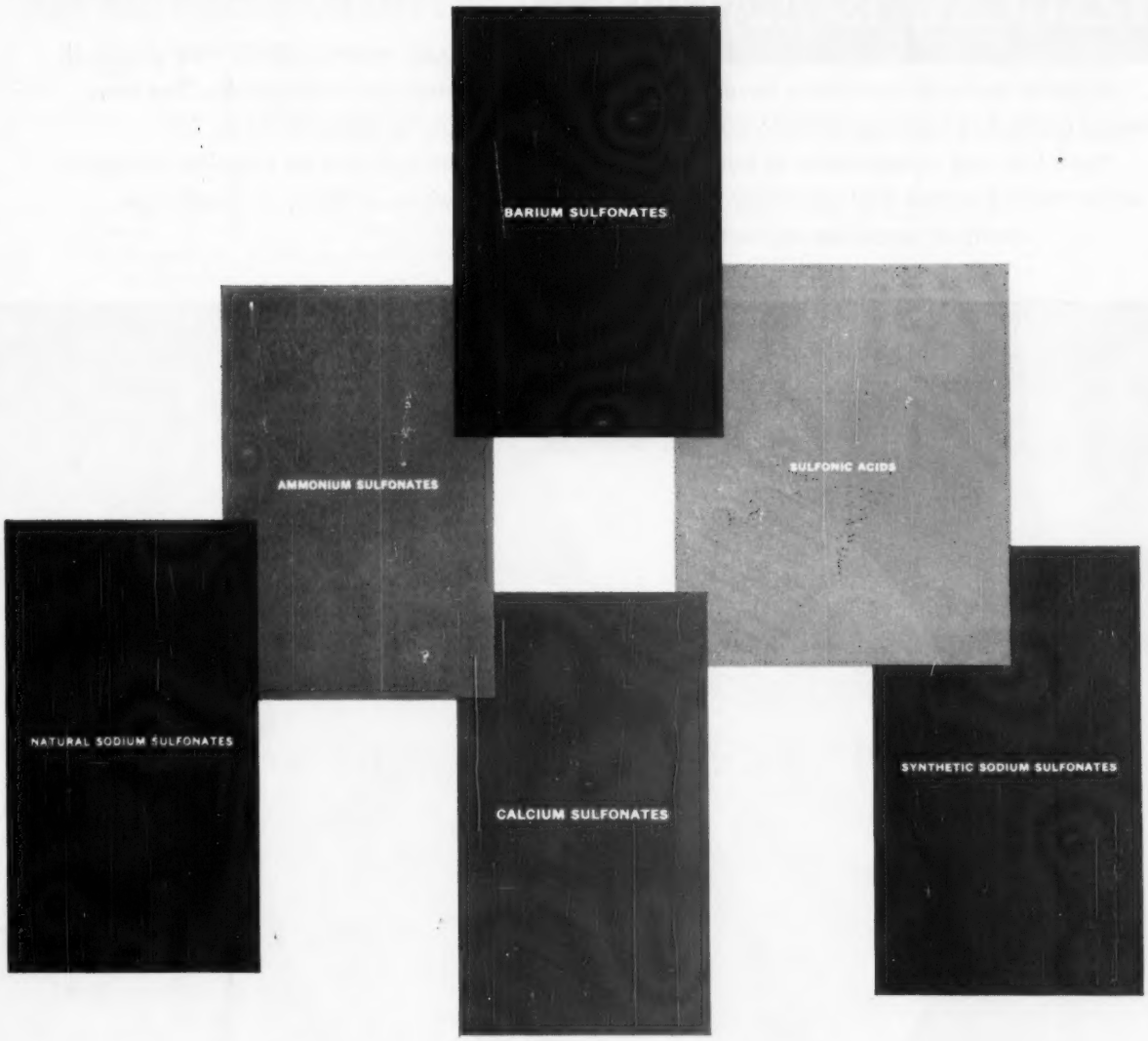

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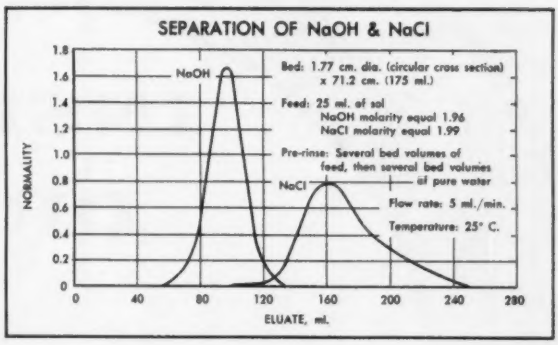
EVEN THOUGH ion exchange resins have proven themselves to be versatile tools in the chemical processing industry, Dow research scientists are continually broadening their usefulness. Entirely new concepts of utilizations such as the elimination of the need for chemical regenerants have increased the economic attractiveness of ion exchange processing. The ion exclusion process, for example, has lowered the cost of the production of U.S.P. glycerine. Moreover, the development of new resin structures has provided chemical processors with better ways of solving long-standing purification problems.

ION RETARDATION

ION RETARDATION OFFERS LOWER COST IONIC SEPARATIONS

Ion retardation is a process based on an entirely new and unique class of ion exchange resins. These are amphoteric (bifunctional) resins containing both anion and cation adsorption sites. These sites have an attraction for each other, but will also associate with mobile anions and cations in solution. However, when these mobile ions are adsorbed, they may be eluted simply by rinsing with water. Since ion retardation eliminates the cost of chemical regenerants, it may be profitably employed where ion exchange is impractical, especially where high concentrations of ions are involved. Though applicable to ionic-ionic separations such as the purification of water soluble organic compounds contaminated with salts, ion retardation is especially unique in its ability to make clean fractionations of ionic-nonionic mixtures. The chart shows an excellent separation of strong electrolytes using Retardion® 11A8, a Dow ion retardation resin.

Since ion retardation is based on the reversible adsorption of electrolytes, good separations of ions from very large organic molecules may be obtained. Retardion 11A8 resin, made by polymerizing acrylic acid inside Dowex® 1 (a Dow strong base quarternary-ammonium resin), has an essentially neutral character which makes it particularly useful for the processing of pH-sensitive compounds. For a specific analysis of the applicability of ion retardation to your processing operation, write to Dow at Midland.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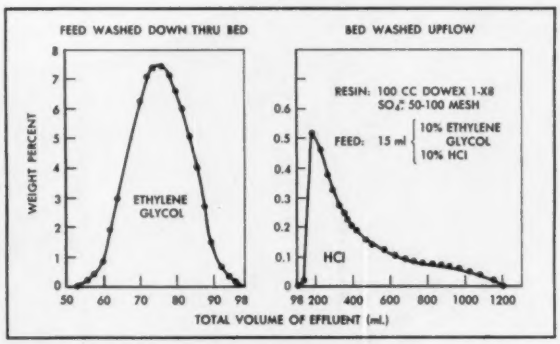

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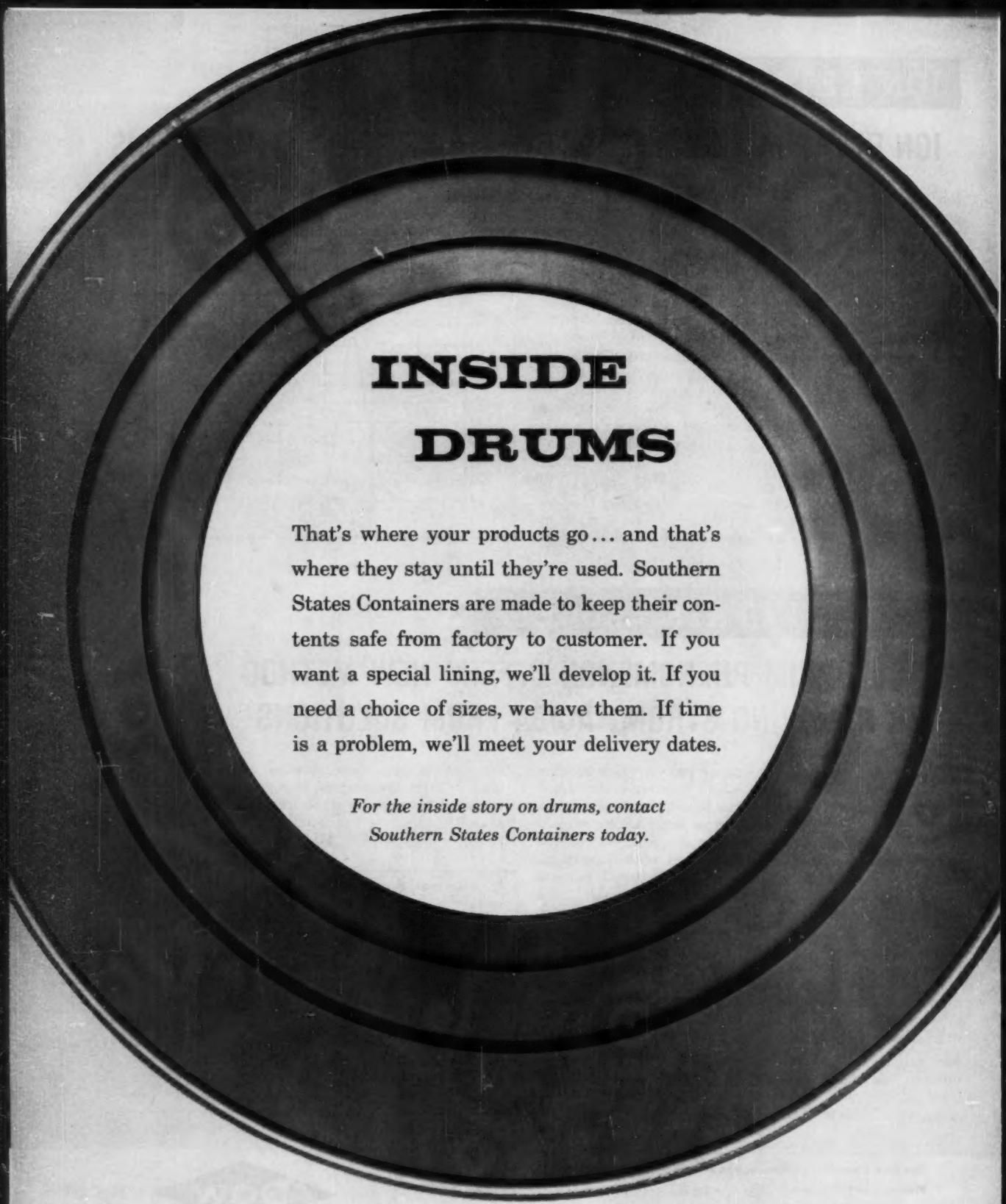
THE DOW CHEMICAL COMPANY

Midland, Michigan



INSIDE DRUMS

That's where your products go... and that's where they stay until they're used. Southern States Containers are made to keep their contents safe from factory to customer. If you want a special lining, we'll develop it. If you need a choice of sizes, we have them. If time is a problem, we'll meet your delivery dates.

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SOUTHERN STATES CONTAINERS

DIVISION OF REYNOLDS ALUMINUM SUPPLY COMPANY

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PROCESSES

Boron Determination: Boron, the most troublesome impurity in hyperpure silicon (*CW, July 16, p. 64*), can be spotted at concentrations of parts per billion in water through a continuous automatic process developed by Technicon Controls, Inc. (Chauncey, N.Y.). The process hinges on boron's ability to form a blue complex with red carminic acid in strongly acid solution. Carminic acid is the essential constituent of carmine, an aluminum lake of the pigment recovered from cochineal. In the automatic process, a sample and carminic acid reagent streams are combined and passed into a mixing coil. The emerging stream is sent into a cooling coil; after reaction in a time-delay coil, it goes to a colorimeter. There the color change is automatically rated (the red carminic acid turns blue when boron is present).

•

Salt-Water Conversion: A 1-million-gal. day sea-to-fresh water conversion plant will be built by Westinghouse Electric Corp. for the U.S. government. The flash-evaporation process, to be used in the San Diego, Calif., plant, incorporates two new features: higher efficiency because of 32 stages vs. the usual 5-12 stages; full instrumentation that will help gather data for evaluating the potential of flash evaporators in general.

•

Oil Switchover: French steelmakers appear to be well advanced in techniques for using fuel oil and gas to supplement coke to blast furnaces (*CW Technology Newsletter, Oct. 15; and CW, April 23, p. 53*). Societe des Acieres de Pompey, one of the leading French producers of special steels, has now decided, after almost 10 years' research and experimentation, to use liquid fuel oil injection in blast furnaces for its entire pig iron production. Pompey's tests show that fuel oil injection increases the capacity of existing blast furnaces 10-20%, while decreasing coke consumption. It has tried pregasification of the oil, as well as direct liquid injection into the tuyeres. During the past year it has been operating one of its commercial furnaces continuously with liquid oil injection. Patents are the property of the High Authority of the Coal and Steel Community for Europe.

Tracers

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POSITIONS VACANT

Manager Required for small bulk chemical storage plant in Newark, New York Area. Chemical Degree and knowledge of Chlorinated Hydrocarbons preferred but not essential. Salary Range: $7,500.00—$9,500.00. P-5615, Chemical Week.

Sales Trainees: B.S. Chemistry, two plus years of analytical laboratory experience desirable. Programmed training in preparation for assignment as Technical Representative. Current openings in the United States and Canada. Salary, bonus, expenses, car, benefits. Send full resume to: P.F. Faupel, Technical Employment Manager, Fisher Scientific Company, 717 Forbes Avenue, Pittsburgh 19, Pennsylvania.

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Wanted—Chemical Salesman with imagination We have excess capacity in large Pfauuler and similar reactors located in Georgia. What can we make that you can sell at a profit? SW-5589, Chemical Week.

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POSITIONS WANTED

B. S. Chemistry—6 yrs selling Industrial Chemicals—Midwest area— will consider relocating. PW-5694, Chemical Week.

Europe. British graduate chemical engineer 10 years all phases chemicals plastics marketing, with international background. Offers experience to U.S. company considering penetrating European market. Age 37, five years management. Can visit New York 1961. PW-5670, Chemical Week.

Purchasing chemicals; excellent experience; age 30; administrative aptitude; college graduate; seeks growth. PW-5629, Chemical Week.

Microbiologist-Biochemist, Ph.D., four years industrial experience. Patents and Publications. Desires position with small or large company. PW-5647, Chemical Week.

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Well establ., aggressive N. Y. Chemical Export firm with branch offices & competent sales agents throughout world, seeks representation from Mfrs. of Petrochemicals & Allied Products. Excellent results assured. RA-5533, Chemical Week.

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If you are a manufacturer seeking new or added sales outlets—or if you are a manufacturer's agent or chemicals distributor with the capacity, time and energy to take on additional lines—make your interests known in this column of Chemical Week. The right agent or jobber teamed up with the saleswise manufacturer makes the right combination for the hard selling days ahead. There's profit for both, which can be initiated through low-cost classified advertising. Write Employment Opportunities, Chemical Week, P.O. Box 12, New York 36, N.Y.

BUSINESS OPPORTUNITIES

Wanted: Patents and/or licensee arrangement, reputable California chemical corporation with facilities in the common markets of Japan and Mexico, interested in additional chemical items for manufacturing and distribution. Petroleum, marine and other specialized applications to industry .All information treated confidential. BO-5594, Chemical Week.

European Market:—Inner six—Outer seven. Are you considering entering the European Market? If so I am prepared to offer my services. You may wish to start on a shoestring basis to consider possibilities. I am young but with over fourteen years executive experience in the chemical and pharmaceutical field. I have already formed and established a company abroad for a large international group and at present hold a senior executive position with an international group in the United Kingdom. What do I seek? A progressive, powerful, decisive, driving company who wish to establish themselves in the United Kingdom, Scandinavia and other leading European countries. If you are interested write to BO-5664, Chemical Week.

BOOKS

Manual of Construction Management. For Chemical and Process Plant. National Schools of Construction. Publishers. Satsuma, Florida.

CHEMICALS FOR SALE

60 Lypks. Aluminum Stearate 32¢ lb. Bulk DOS Plast. 32¢/lb. (dark). Bulk DBS Plast 33¢/lb. w/w. Bulk Acetone Redistilled 43¢/gal. Monochlorobenzene-Bulk, 25,000# 7¢/lb. FS-5611, Chemical Week.

EQUIPMENT FOR SALE

Liquidation, $8,000,000 Alcohol Plant at Omaha, Nebraska. Dryers, Filters, Stills, Evaporators, Exchangers, Tanks, Pumps, etc. Send for circular. Perry, 1415 N. Sixth St., Phila. 22, Pa.

2500 gal. T316 SS Tank 7' x 7' Vert., dished heads, 70# WP, 3 HP prop. agit. Perry, 1415 N. Sixth St., Phila. 22, Pa.

Epoxy Resins Plant for sale. 65,000 sq. ft. Fully equipped. Ready to roll. Large water capacity. 113 acres. Eastern Penna. Robert N. Jordan, Beury Bldg., Phila. 40, Pa., Baldwin 8-0200. Brochure available.

1350 gal T347 Stainless Jacketed Kettle, ¼" flat top, anchor and paddle agitator, reducer etc. Perry, 1415 N. 6th St., Phila. 22, Pa.

1960 sq. ft. T316 Stainless Horizontal Heat Exchanger, ASME 75# W.P. Perry, 1415 N. Sixth St., Philadelphia 22, Pa.

CHEMICALS WANTED

Surplus Wanted—Chemicals, Pharmaceuticals, Oils, Acids, Plasticizers, Resins, Dyes, Solvents, Pigments, Etc. Chemical Service Corporation, 96-02 Beaver Street, New York 5, N. Y. HAnover 2-6970.

Wanted: Custom sulfonator for proprietary detergent product. Annual volume, 1 million pounds. W-5686, Chemical Week.

MISCELLANEOUS

To Employers Who Advertise for Men: The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received, much less given any consideraion.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Duly Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements. Classified Advertising Division, McGraw-Hill Publishing Company, "Put Yourself in the Place of the Other Fellow."

Chemical Week

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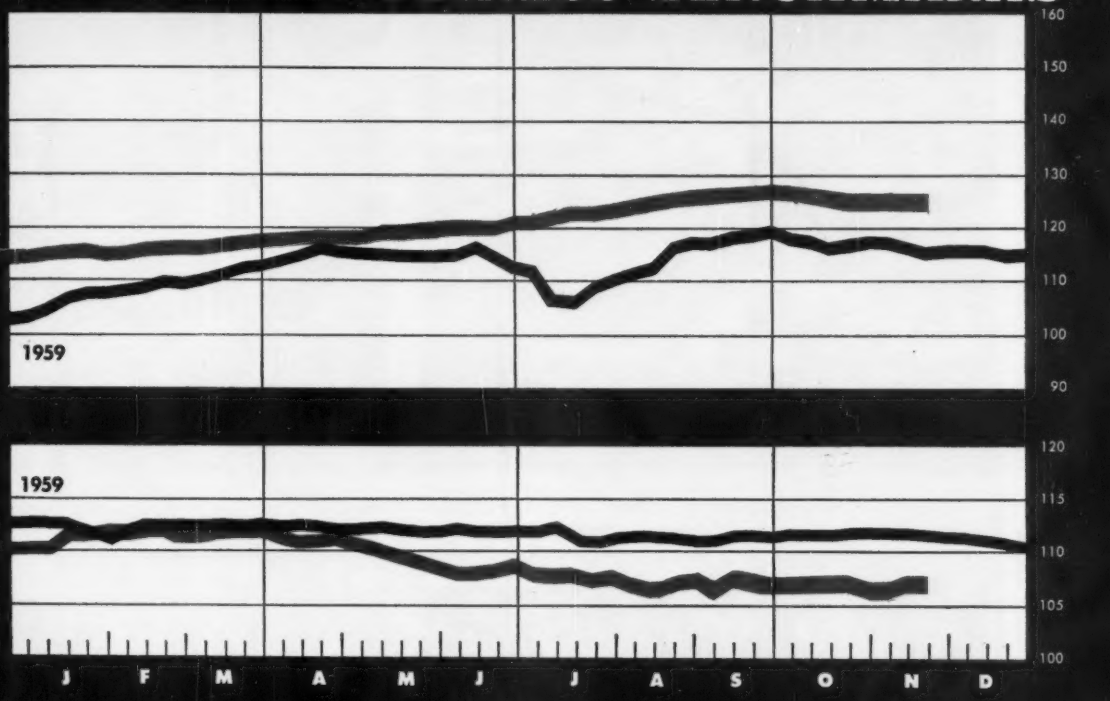
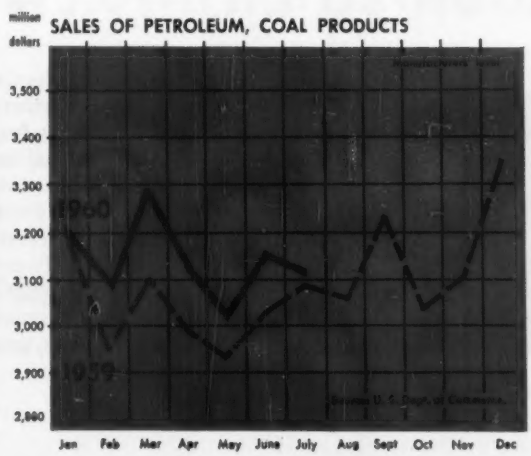


NOVEMBER 26, 1960

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	125.2	125.0	116.9
Chemical Week wholesale price index (1947=100)	107.3	107.3	110.9
Stock price index (12 firms, Standard & Poor's)	47.41	46.79	58.22
Steel ingot output (thousand tons)	1,464	1,468	2,233
Electric power (million kilowatt-hours)	14,111	13,982	13,270
Crude oil and condensate (daily av., thousand bbls.)	6,955	6,940	6,875

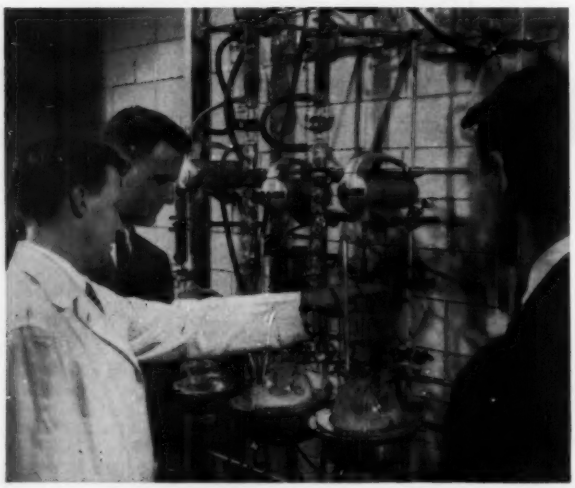
EMPLOYMENT INDICATORS (in thousands)	Latest Month	Preceding Month	Year Ago
All manufacturing	16,465	16,396	16,367
Nondurable goods	7,094	7,095	7,142
Chemicals and allied products	879.5	882.4	860.8
Paper and allied products	569.4	567.6	571.8
Rubber products	258.9	257.6	273.5
Petroleum and coal products	228.5	229.6	231.7

CHEMICAL CUSTOMERS CLOSE-UP



ENJAY OLEFINS – Enjay markets tetrapropylene, tripropylene and nonene. These chemicals fulfill the most rigid requirements as raw materials for anionic and nonionic detergents. Uniform purity and high quality contribute to the modern detergent's ability to get hard-to-wash surfaces cleaner.

TRIDECYL ALCOHOL – Water soluble nonionic surface active agents formed by the reaction of tridecyl alcohol with ethylene oxide are extremely well suited for use as household detergents. Surfactants made with tridecyl alcohol help increase penetrating power and loosen dirt.



TECHNICAL ASSISTANCE – At the Enjay laboratories, expert technical assistance and the latest testing facilities are available. Here, Enjay technical personnel can help you develop new products . . . improve existing ones.

QUICK SHIPMENTS – Shipments are made from conveniently located plant and storage facilities. Surfactant manufacturers are assured of prompt delivery and high uniform product quality when they order from Enjay.

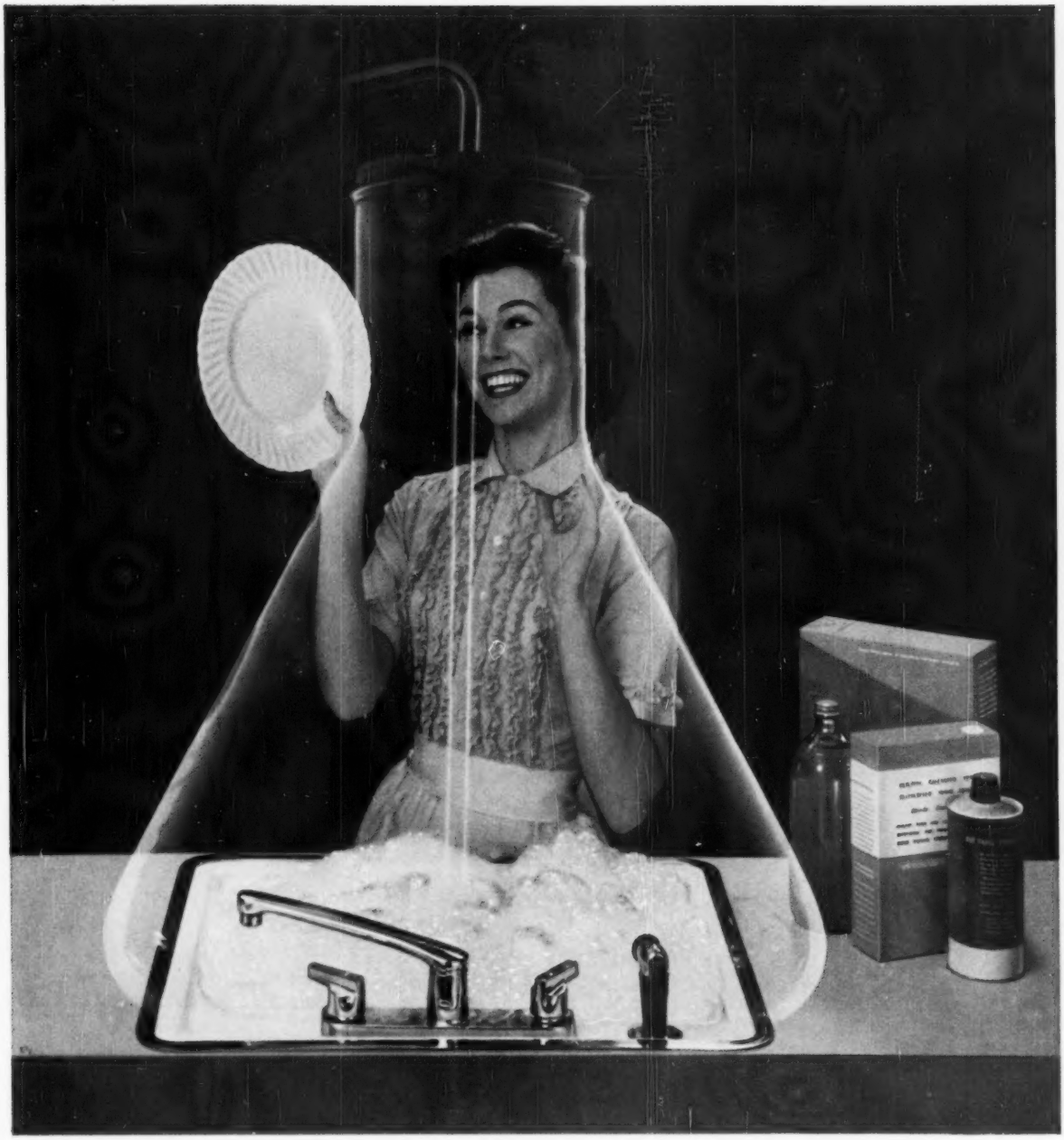
LOOK TO ENJAY...A DEPENDABLE SOURCE

ENJAY
PETROCHEMICALS

Manufacturers of surfactants need look no further than their nearest Enjay office for their raw material and technical service needs. A complete line of chemicals for light- and heavy-duty detergents—powdered or liquid—as well as emulsifiers, wetting agents and foam stabilizers are available for prompt delivery.

Enjay chemicals like tetrapropylene, tripropylene and nonene fulfill the most rigid requirements as basic ingredients for anionic and nonionic detergents. They contribute to the modern detergent's ability for getting hard-to-wash surfaces cleaner . . . with less work.

Enjay also markets other chemicals for surfactants. These include Isooctyl Alcohol—Tridecyl Alcohol—Decyl Alcohol—Isopropyl Alcohol—and Ethyl Alcohol. For further



FOR YOUR SURFACTANT RAW MATERIALS

information or technical assistance, phone or write the Enjay office nearest you. *Home Office:* 15 West 51st Street, New York 19, N. Y. *Other Offices:* Akron • Boston Charlotte • Chicago • Detroit Houston • Los Angeles • New Orleans Plainfield, N. J. • Tulsa

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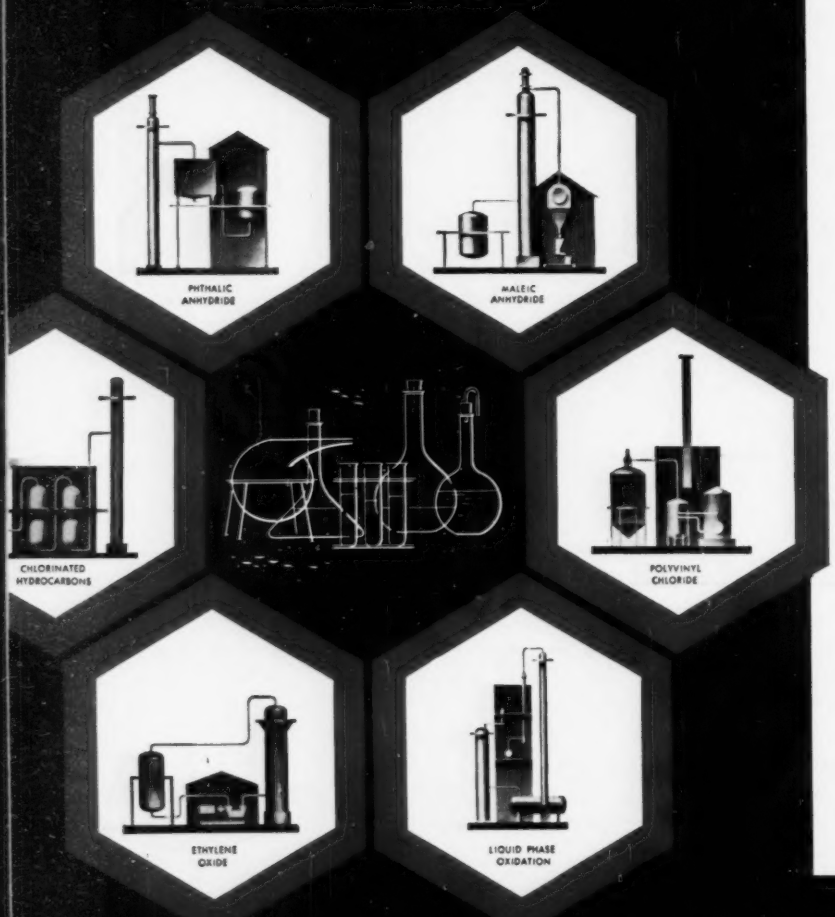
ENJAY

PETROCHEMICALS

SCIENTIFIC DESIGN

continues to lead in the development of

New Chemical Processes



Another example of chemical process skill

SD Phenol Process

Scientific Design's recently announced phenol process, which effectively converts benzene to phenol with air, offers many important technological and economic advantages. It is the result of a deliberate research effort in SD's own laboratories at Little Ferry, N. J., to find a process which features low capital investment and absence of by-products for sale or other disposal.

This process is, therefore, well suited to any size, including smaller "package plant" installations. It assures lower production costs and profitable output. It is outstanding in larger sizes where its economies make phenol a very attractive product.

The SD process offers a basic simplicity in concept and for the first time a scale of operation within the scope of many chemical producers throughout the world.

SCIENTIFIC DESIGN COMPANY, INC.

Leader in Design, Development, Construction of Chemical Plants

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